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PRC

PRELIMINARY ASSESSMENT/ VISUAL SITE INSPECTION

GREDE FOUNDRIES, INC.
KINGSFORD, MICHIGAN
MID 006 131 890

FINAL REPORT

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, DC 20460

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EXECUTIVE SUMMARY

PRC Environmental Management, Inc. (PRC), performed a preliminary assessment and visual site inspection (PA/VSI) to identify and assess the existence and likelihood of releases from solid waste management units (SWMU) and other areas of concern (AOC) at the Grede Foundries, Inc. (Grede), facility in Kingsford, Dickinson County, Michigan. This summary highlights the results of the PA/VSI and the potential for releases of hazardous wastes or hazardous constituents from SWMUs and AOCs identified.

The Grede facility is a gray iron foundry that manufactures highly cored castings to customer specifications. The facility generates and manages the following waste streams: cupola emissions dust, slag, wheelabrator waste sand, waste foundry sand, waste refractory, broken cores, core butts, treatment sludge, and polychlorinated biphenyls (PCB) capacitors and transformers removed from service.

The facility has operated at its current location since 1946. The facility occupies 72 acres in a mixed-use area and employs about 487 people. The facility is currently regulated as a conditionally exempt small-quantity generator of hazardous waste. The facility submitted its Part A permit application in November 1980 that included treatment (T04) of cadmium (D006) and lead (D008) wastes. In January 1991, the facility received approval of a totally enclosed treatment (TET) exemption for these wastes. The facility is in the process of closing the On-Site Facility Landfill (SWMU 8), and the facility is waiting approval from the Michigan Department of Natural Resources (MDNR) to abandon the Former Underground Storage Tanks (AOC 1) in place and close the Hazardous Waste Treatment System (SWMU 10). Currently, the facility is involved in litigation with MDNR concerning the closure of SWMU 8, SWMU 10, and AOC 1.

The PA/VSI identified the following eleven SWMUs and one AOC at the facility:

Solid Waste Management Units

1. North Foundry Waste Bunker
2. South Foundry Waste Bunker
3. Satellite Foundry Waste Hoppers
4. Wheelabrator Waste Sand Hopper
5. Main Plant Waste Storage Area
6. Module Molding Process Waste Hopper
7. Core Oil Bunker
8. On-Site Facility Landfill
9. Semitrailers
10. Hazardous Waste Treatment System
11. TET System

Area of Concern

1. Former Underground Storage Tanks

All SWMUs have a low potential for release to ground water, surface water, air, and on-site soils, either because of sound secondary containment or because the unit is indoors. The facility is in the process of capping the On-Site Facility Landfill (SWMU 8) and ground-water monitoring wells analysis shows no leaching to the ground water from this unit.

As part of the TET exemption, the facility needed to close the Hazardous Waste Treatment System (SWMU 10). This SWMU consists of four components according to the closure documentation report: baghouse auger; mixing truck; haul roads; and transfer area. The facility decontaminated the baghouse auger, mixing truck, and paved haul roads in the area and received approval for the disposal of the rinsates. Preliminary soil sample analysis of the earthen transfer area indicated 6.56 and 133 grams per kilogram (g/kg) of cadmium and lead, respectively. One foot of topsoil (about 450 tons) was removed from the transfer area. The MDNR did not approve closure certification because the facility did not define the extent of contamination and remove all contaminated soil. The facility explained that they followed the approved work plan and are waiting for MDNR's final decision. The potential for release to ground water, surface water, and air from SWMU 10 is low because the extent of contamination appears to be limited to the surface soil surrounding the transfer area.

During in-place abandonment of the core oil and parting oil Former Underground Storage Tanks (AOC 1) below the pattern shop floor, seven carcinogenic polynuclear aromatic hydrocarbons (PAH) were identified in the surrounding soil, with concentrations ranging from 95 to 2,600 micrograms per kilogram (μg/kg). In addition, monitoring wells installed around the units detected tetrachloroethylene and 1,1,1-trichloroethane at concentrations up to 1.6 and 1.5 micrograms per liter (μg/l). Excavation of the soil was not possible because the tanks are located below the pattern shop floor. The potential for release to surface water and air from AOC 1 is low because the contamination is contained below the concrete floor of the pattern shop.

Receptors of potential releases from the Grede facility include Grede employees and residents of Kingsford. The nearest residences are located to the south, across Breitung Avenue, 50 feet away. A 6-foot-high fence surrounding the facility and 24-hour surveillance control facility access.

The City of Kingsford operates ground-water production wells for its municipal water supply. These wells are 2.5 miles northwest and upgradient of the facility.

The nearest surface water body, Crystal Lake, is about 4000 feet northwest of the facility and is used for recreation purposes. Other surface water bodies in the area include Power Lakes, about 5,000 feet to the east, and the Menominee River, about 1 mile to the southwest of the facility. The Menominee River is used recreationally and discharges to Green Bay, about 85 stream miles southeast of the facility. Two sensitive wetland environments around Crystal Lake and the Menominee River are located within 2 miles of the facility.

PRC recommends that the facility continue monitoring ground water at the On-Site Facility Landfill (SWMU 8) and the Former Underground Storage Tanks (AOC 1) for possible contaminant migration and that the extent of contamination around the transfer area in the Hazardous Waste Treatment System (SWMU 10) be defined for closure. PRC recommends that closure be completed for the On-Site Facility Landfill (SWMU 8) and the Hazardous Waste Treatment System (SWMU 10). Also, the inside of the Core Oil Bunker (SWMU 7) should be kept dry.

1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC), received Work Assignment No. R05032 from the U.S. Environmental Protection Agency (EPA) under Contract No. 68-W9-0006 (TES 9) to conduct preliminary assessments (PA) and visual site inspections (VSI) of hazardous waste treatment and storage facilities in Region 5.

As part of the EPA Region 5 Environmental Priorities Initiative, the RCRA and CERCLA programs are working together to identify and address RCRA facilities that have a high priority for corrective action using applicable RCRA and CERCLA authorities. The PA/VSI is the first step in the process of prioritizing facilities for corrective action. Through the PA/VSI process, enough information is obtained to characterize a facility's actual or potential releases to the environment from solid waste management units (SWMU) and areas of concern (AOC).

A SWMU is defined as any discernible unit at a RCRA facility in which solid wastes have been placed and from which hazardous constituents might migrate, regardless of whether the unit was intended to manage solid or hazardous waste.

The SWMU definition includes the following:

- RCRA-regulated units, such as container storage areas, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, and underground injection wells
- Closed and abandoned units
- Recycling units, wastewater treatment units, and other units that EPA has usually exempted from standards applicable to hazardous waste management units
- Areas contaminated by routine and systematic releases of wastes or hazardous constituents. Such areas might include a wood preservative drippage area, a loading or unloading area, or an area where solvent used to wash large parts has continually dripped onto soils.

An AOC is defined as any area where a release to the environment of hazardous waste or constituents has occurred or is suspected to have occurred on a nonroutine and nonsystematic basis. This includes any area where a strong possibility exists that such a release might occur in the future.

The purpose of the PA is as follows:

- Identify SWMUs and AOCs at the facility
- Obtain information on the operational history of the facility
- Obtain information on releases from any units at the facility
- Identify data gaps and other informational needs to be filled during the VSI

The PA generally includes review of all relevant documents and files located at state offices and at the EPA Region 5 office in Chicago.

The purpose of the VSI is as follows:

- Identify SWMUs and AOCs not discovered during the PA
- Identify releases not discovered during the PA
- Provide a specific description of the environmental setting
- Provide information on release pathways and the potential for releases to each medium
- Confirm information obtained during the PA regarding operations, SWMUs, AOCs, and releases

The VSI includes interviewing appropriate facility staff; inspecting the entire facility to identify all SWMUs and AOCs; photographing all visible SWMUs; identifying evidence of releases; making a preliminary selection of potential sampling parameters and locations, if needed; and obtaining additional information necessary to complete the PA/VSI report.

This report documents the results of a PA/VSI of the Grede Foundries, Inc. (Grede), facility (EPA Identification No. MID 006 131 890) in Kingsford, Dickinson County, Michigan. The PA was completed on June 23, 1992. PRC gathered and reviewed information from the Michigan Department of Natural Resources (MDNR), the U. S. Department of Commerce (DOC), the U.S. Department of the Interior (DOI), and from EPA Region 5 RCRA files. The VSI was conducted on June 24, 1992. It included an interview with a facility representative and a walk-through inspection of the facility. PRC identified eleven SWMUs and one AOC at the facility.

The VSI is summarized and 16 inspection photographs are included in Attachment A. Field notes from the VSI are included in Attachment B.

2.0 FACILITY DESCRIPTION

This section describes the facility's location; past and present operations; waste generating processes and waste management practices; a history of documented releases; regulatory history; environmental setting; and receptors.

2.1 FACILITY LOCATION

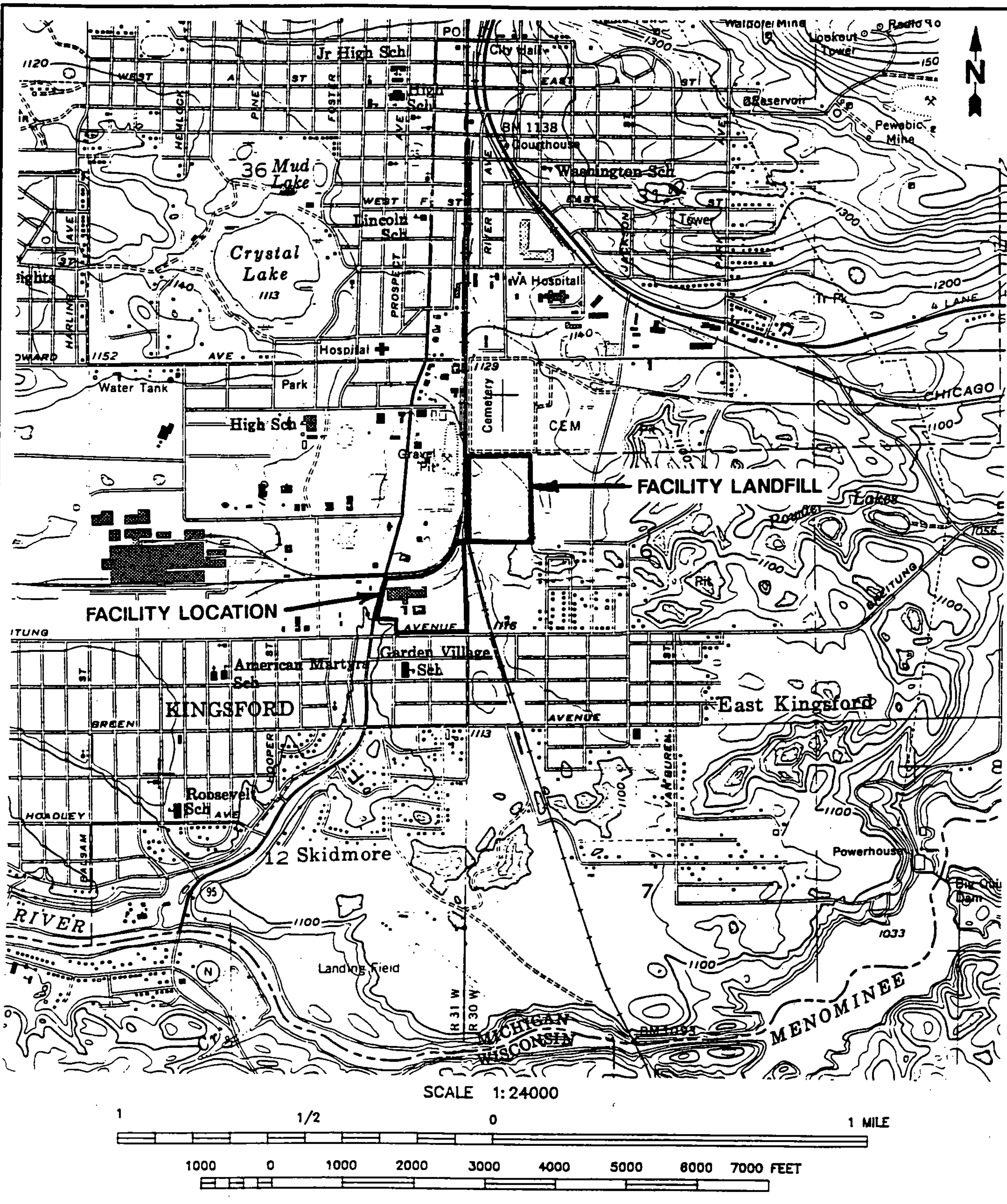
The Grede facility is located at 801 South Carpenter Avenue in Kingsford, Dickinson County, Michigan (latitude 45°48'00" N and longitude 88°04'00" W). Figure 1 shows the location of the facility in relation to the surrounding topographic features . The facility occupies 72 acres in a mixed-use area.

The facility is bordered on the north by an automobile dealership and a cemetery; on the west by Carpenter Avenue, a fast-food restaurant, and a church; on the south by Breitung Avenue and residences; and on the east by Iron Mountain Woodlands. The Escanaba Railroad separates the landfill from the foundry building.

2.2 FACILITY OPERATIONS

The Grede facility is a gray iron foundry that manufactures highly cored castings to customer specifications. The iron is processed in a cupola furnace and then stored in one of two 28-ton holding furnaces. Customers supply Grede with mold and die patterns used to form green sand molds and sand cores. Green sand is made up of return sand from shakeout, new silica sand, bentonite, causticized lignite, and sea coal. City water and black water from wet dust collectors is added to the mixture so that the green sand can be packed very tightly around the molds.

Sand cores are placed within the green sand molds to make up the internal passages of the iron castings. Molten iron is poured into the green sand molds and allowed to cool and harden. Once cool, iron castings are taken to the cleaning room for shakeout or removal of the green sand mold and part of the internal sand cores. Castings are then placed into one of four very large tumblers called wheelabrators. Castings are bounced around in the wheelabrators to remove sand embedded in the surface of the iron casting. Inside the wheelabrator, iron castings are also blasted with steel shot to help clean the surface. The sand and steel shot exit the wheelabrator and are sifted to remove shot for reuse in the wheelabrator. Steel shot is automatically



SOURCE: MODIFIED FROM USGS, 1982

GREDE FOUNDRIES, INC.
KINGSFORD, MICHIGAN

FIGURE 1
FACILITY LOCATION

PRC ENVIRONMENTAL MANAGEMENT, INC.

replenished as needed. The sand, dust, and steel shot that passes through the sifter are placed in the Wheelabrator Waste Sand Hopper (SWMU 4). Cleaned iron castings from the wheelabrator are ground or sanded, as requested by the customer, to form the finished product.

The following charge materials may go into the cupola furnace to make up the molten gray iron: scrap steel, pig iron, ductile iron, scrap castings, pigheels, coke, coal, limestone, silicon carbide, lump ferro-silicon, illmenite briquettes, ferro-manganese briquettes, and Ferro-phos. Scrap metals, coke, coal, and limestone are stored in piles outside, partially covered by a free-standing roof, along the north end of the building.

Sand cores are formed by one of four processes, depending on the structure of the cores. The first process is the cold-box process which uses an amine gas (dimethylethylamine) to activate resins added to the silica sand in ambient air. The cold box process uses the most sand of the four core processes, and the cores have a very low ratio of surface area to volume of sand. The second process is the hot-box process. The hot-box process starts with a resin-coated silica sand. The coated sand is heated to 450°F to bind the particles together. The third process, called the warm-air process, is not used very often at the facility. The warm-air process uses warm air at about 250 to 300°F to bind resins added to the silica sand. The fourth process makes specialty cores and is called the oil core process. The oil cores have a very high ratio of surface area to volume of sand.

The facility's metallurgical lab uses a spectrometer and a validator to test iron castings for metallurgical quality. The only waste generated in this lab are scrap castings that will go back into the cupola furnace as charge material.

The facility's sand lab checks the tensile and compression strength, size fraction, and clay content of the sand cores. Waste cores are the only wastes generated in this lab.

Scrap metal used as part of the charge material in the cupola furnace causes the furnace emissions dust from the baghouse to be extraction procedure (EP) toxic for cadmium (D006) and lead (D008). Past disposal practices included mixing the cupola emissions dust with nonhazardous waste foundry sand and dust so that the resulting mixture no longer met EPA hazardous waste criteria, particularly EP toxicity. The facility states that this process is not dilution but an attenuation of hazardous constituents due to the bentonite clay in the foundry sand. At an average mixing ratio of about 7 parts waste foundry sand and dust to 1 part cupola emissions dust, the attenuation level for cadmium was over 50 percent greater than dilution, and the attenuation level for lead was over 500 percent greater than dilution (Grede, 1986). The attenuated mixture was placed in an unlicensed landfill run by Smeester Brothers Trucking

(Smeester) in Iron Mountain, Michigan, from 1962 until 1986, when it was closed by MDNR. From September 1986 to July 1990, this waste was placed in Grede's on site type III landfill, (SWMU 8), Michigan permit No. 7214, expiration August 20, 1988 (PRC, 1992a).

In August 1991, Grede had a Totally Enclosed Treatment (TET) System (SWMU 11) installed to their baghouse. Before the cupola emission dust enters the baghouse, Portland cement and soda ash are added in what is called the injection box. In the injection box, a chemical reaction occurs that bonds the hazardous constituents of the waste stream, rendering the collected cupola emissions dust from the baghouse nonhazardous (Grede, 1991b). Grede still mixes this dust with foundry sand at a ratio of 3 to 1 for dust control when it is disposed of in the United Waste Systems (UWS) type II landfill in Menominee, Michigan.

Grede has operated at the facility since 1946 and employs about 487 people. The facility first opened at this location in 1946 in joint operation with Lakeshore, Inc. (Lakeshore), a mining equipment machining and fabrication company. Grede made castings for Lakeshore's mining equipment. Grede and Lakeshore co-occupied the facility from 1946 to 1965. A number of modifications to the facility took place in the 1970s: a maintenance building was built in 1970, with additions in 1973 and 1977; a module molding process area was built in 1974; a core storage area was built in 1976; and additional core formation areas were built in about 1978.

The facility has a melt capacity of 83,250 tons per year. The facility consists of a 155,800 square foot building housing offices as well as production areas. The production areas contain two melt centers, two molding lines, and four core process lines. Employee and visitor parking lots lie on the south and west sides of the facility.

Solid wastes generated from facility operations and the SWMUs where they are managed are discussed in detail in Section 2.3.

2.3 WASTE GENERATION AND MANAGEMENT

Primary waste streams generated at the Grede facility include cupola emissions dust, slag, waste sands, waste refractory, broken cores, core butts, and sludge. These wastes are generated during the production of highly cored iron castings. Since 1983, Grede has been removing capacitors and transformers, generating PCB wastes. In addition, Grede has one parts washer maintained by Safety-Kleen Corporation (Safety-Kleen).

Facility SWMUs are identified in Table 1. The facility layout, including SWMUs and AOCs, is shown in Figure 2. The facility's waste streams are summarized in Table 2. Annual

TABLE 1

SOLID WASTE MANAGEMENT UNITS

SWMU Number	SWMU Name	RCRA Hazardous Waste Management Unit[a]	Status
1	North Foundry Waste Bunker	No	Active
2	South Foundry Waste Bunker	No	Active
3	Satellite Foundry Waste Hoppers	No	Active
4	Wheelabrator Waste Sand Hopper	No	Active
5	Main Plant Waste Storage Area	No	Active
6	Module Molding Process Waste Hopper	No	Active
7	Core Oil Bunker	No	Active
8	On-Site Facility Landfill	No	Inactive, currently undergoing closure
9	Semitrailers	No	Active
10	Hazardous Waste Treatment System	Yes	Active, currently undergoing closure[b]
11	Totally Enclosed Treatment System	No	Active

Note:

a A RCRA hazardous waste management unit is one that currently requires or formerly required submittal of a RCRA Part A or Part B permit application.

b Inactive as a hazardous waste management unit.

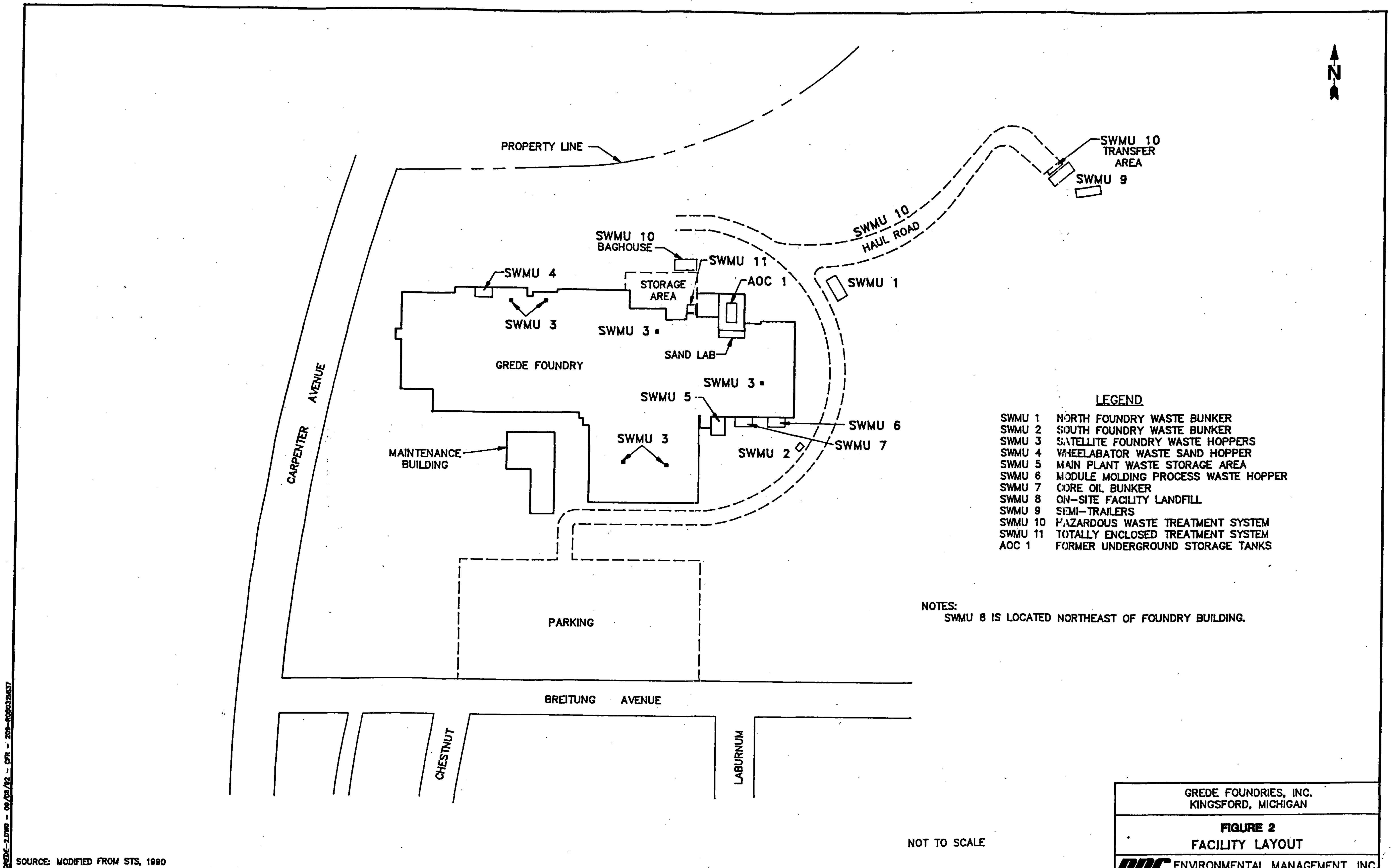


FIGURE 2
FACILITY LAYOUT

TABLE 2
SOLID WASTES

Waste/EPA Waste Code[a]	Source	Solid Waste Management Unit[b]
Cupola Emissions Dust/D006 and D008	Cupola furnace	SWMUs 8, 9, 10, and 11
Slag/NA	Molten iron system	SWMUs 1, 3, and 8
Wheelabrator Waste Sand/NA	Cleaning of castings	SWMUs 4 and 9
Waste Foundry Sand/NA	Shake out and mold formations	SWMUs 1, 2, 3, 5, 6, 8, and 9
Waste Refractory/NA	Heat protection	SWMUs 1, 3, and 8
Broken Cores and Core Butts/NA	Production	SWMUs 1, 2, 3, 5, 6, and 8
Treatment Sludge/NA	Dust control and maintenance	SWMUs 2, 3, and 8
PCB Capacitors and Transformers/NA	Electrical equipment	SWMU 7
Safety Kleen Parts Washer Fluid/D001	Maintenance	None

Notes:

a Not applicable (NA) designates nonhazardous waste.

b "None" indicates that the waste stream is not managed on site.

generation rates presented are based on 1991 waste generation data. Grede generates 26,000 tons of waste annually.

Melting charge material in the cupola furnace to produce gray iron produces emissions dust. Depending on the final product specifications, a wide variety of scrap metal may be used. The scrap metal may contain a variety of metals, metal concentrations, and possible organics such as used oils, and transmission fluids. Each molten ton of gray iron produces about 18 pounds of cupola emissions dust which is EP toxic for cadmium (D006) and lead (D008). Emissions from the cupola furnace are directed to the TET system, where they are mixed with Portland cement and soda ash. Air blown ducts in the injection box mix the compounds as the emissions dust exits the cooling zone or quench tank. The temperature in the injection box is around 500°F. About 3.5 pounds of Portland cement and 1.5 pounds of soda ash are added to the 18 pounds of cupola emissions dust produced per ton of gray iron, rendering the cupola emission dust no longer EP toxic. As the dust mixture is removed from the emission stream, the cupola dust, Portland cement, and soda ash collect in the baghouse hopper and screw conveyor. The screw conveyor transfers the waste directly to a mixing truck where waste foundry sand is added at a ratio of 3 to 1 for dust control. The mixing truck transports the waste to the transfer area, northeast of the facility, where it is transferred to the Semitrailers (SWMU 9). About 686 tons of this waste are generated annually.

Melting various scrap metals and pigheels generate a molten residual in the furnaces and transport vessels. This residual, called slag, is poured into the Satellite Foundry Waste Hoppers (SWMU 3), for hardening. The hoppers are moved outdoors to the North Foundry Waste Bunker (SWMU 1), where the slag is allowed to cool. About 3,050 tons of this waste are generated annually.

Cleaning hardened castings generates a nonreusable wheelabrator waste sand. After shakeout or removal of the green sand mold, sand is embedded in the outer layer of the castings. The castings are placed in a large tumbler and shotblaster that cleans the surface of the castings. Reusable steel shot is sifted from the wheelabrator waste stream. The sand and steel shot that pass through the sifter are stored in the Wheelabrator Waste Sand Hopper (SWMU 4). About 1,363 tons of this waste are generated annually. This waste is ultimately mixed with the cupola emissions dust in the mixing truck for disposal.

Waste foundry sand from the shakeout process is not returned to the system. This waste is either accumulated in Satellite Foundry Waste Hoppers (SWMU 3) or transported outdoors by conveyor to either the Main Plant Waste Storage Area (SWMU 5), or the Module Molding Process Waste Hopper (SWMU 6). About 11,900 tons of this waste are generated annually. The contents of SWMUs 3 and 5 are dumped into either the North or South Foundry Waste Bunker (SWMU 1 or 2). Waste sand from the Module Molding Process Waste Hopper (SWMU 6) is transported by Gauthier directly to the UWS type II landfill in Menominee. As needed, the foundry sand is also added to the cupola emissions dust in the mixing truck to control dust in the Semitrailers (SWMU 9) and at the landfill.

All metal foundry equipment that comes in contact with molten iron must be protected from the heat. A protective lining or refractory containing bentonite, such as Allopatch® and Carb-Shield®, is used. Periodic replacement of these linings generates a nonhazardous waste refractory. This waste is accumulated in the Satellite Foundry Waste Hoppers (SWMU 3) and stored in the North Foundry Waste Bunker (SWMU 1). About 1,000 tons of this waste are generated annually.

Difficult core structures and core handling often cause cores to break. In addition, the butts of the core that protrude from the iron castings to form the internal openings in the cast generate a nonreusable nonhazardous waste. This waste is accumulated in the Satellite Foundry Waste Hoppers (SWMU 3), the Main Plant Waste Storage Areas (SWMU 5), and the Module Molding Process Waste Hopper (SWMU 6). About 5,250 tons of this waste are generated annually.

Wet dust collectors are used for dust control in many facility processes. These collectors have a large settling tank where dust settles to the bottom as a treatment sludge. A chain conveyor scours the bottom of the settling tank, dumping the treatment sludge down a metal chute to the Satellite Foundry Waste Hoppers (SWMU 3). The sludge is made up of fine sand, silica oxides, clay, and metallic dust from grinding. The water in this system, called black water, is reused. The black water is added to silica sand to make up green sand for the casting molds. Waste from SWMU 3 is then dumped into SWMU 2. About 3,250 tons of treatment sludge is generated annually.

Since 1983, Grede has been removing its PCB-containing capacitors and transformers. Waste PCB capacitors and transformers are stored in containers in the Core Oil Bunker (SWMU 7). PCB waste generation rates vary, depending upon when and which machines are removed from service. In 1984, Transcology, Inc., transported an unknown quantity of PCB capacitors and transformers to Rollins Environmental Services (Rollins) in Deer Park, Texas, for incineration. In 1985, Midwest Electrical Testing and Maintenance Company transported 1,170 pounds of this waste to Rollins for incineration. No PCB transformers that contain greater than 50 parts per million (ppm) remain at the facility; eight PCB capacitors remain in use.

The Grede facility has one parts washer (D001) in the maintenance building that is maintained by the Safety Kleen Corporation in Kaukauna, Wisconsin.

Between September 1986 and July 1990 all generated wastes at the facility, except PCB wastes, were disposed of in the On-Site Facility Landfill (SWMU 8). Currently, Ed Gauthier and Sons Excavating (Gauthier) transports cupola emissions dust, slag, waste refractory, broken cores and core butts, and treatment sludge wastes off site to the UWS type II landfill in Menominee, Michigan, for disposal.

2.4 HISTORY OF DOCUMENTED RELEASES

This section discusses the history of documented releases to ground water, surface water, air, and on-site soils at the facility.

On August 18, 1990, the facility notified MDNR that oil had been released from underground storage tanks (UST) at the facility. Grede abandoned the Former USTs (AOC 1) in early July 1990 and became aware that the tanks had leaked during a site assessment on July 25, 1990. The two USTs were used, 12,000-gallon railroad cars that had been buried outside the northeast corner of the foundry building in about 1955. About 6 years after that, a pattern shop was built over the tanks. The USTs were used to store core oil and parting oil, petroleum based liquids used in the metal casting process. The USTs were abandoned when the facility replaced them with aboveground storage tanks. In-place abandonment of the USTs was required due to the tanks' location below the concrete floor of the pattern shop. The tanks were cleaned and filled with sand and a sandy clay mixture between July 2 and 9, 1990.

Soil sample analysis conducted in July 1990, indicated contamination under the south end of the USTs. Seven carcinogenic polynuclear aromatic hydrocarbons (PAH) were identified with concentrations ranging from 95 to 2,600 micrograms per kilogram (μg/kg) (MDNR, 1991e). Three shallow monitoring wells were installed in September 1990 to monitor contaminant migration. Two compounds were detected in the downgradient well: tetrachloroethylene at 1.6 micrograms per liter (μg/L) and 1,1,1-trichloroethane at 1.5 μg/L. In August 1991, three additional monitoring wells were installed to provide vertical characterization of the ground water. Preliminary field screening of the ground water showed 1,1,1-trichloroethane at three discrete depths at the downgradient well, ranging from 1.0 μg/L at the aquifer bottom to 1.3 μg/L at the water table (MDNR, 1991e). Tetrachloroethylene and 1,1,1-trichloroethane were consistently detected in the downgradient well at concentrations between 0.6 and 2.0 μg/L (STS, 1990). Excavation of the soils was not an option because the pattern shop had been built over the USTs. The facility continues to monitor contaminant migration in the ground water.

During closure of the Hazardous Waste Treatment System (SWMU 10), preliminary soil sample analysis revealed elevated levels of cadmium and lead (6.56 g/kg and 133 g/kg, respectively) in surface soil surrounding the transfer area. The transfer area consists of a 6-foot-high earthen ramp with a 100-foot gravel access road. One foot of topsoil was removed from the transfer area. About 450 tons of contaminated soil was removed and disposed of at Michigan Environs type II landfill in Menominee, Michigan. Additional soil samples of the excavation revealed lower levels of cadmium and lead (0.28 g/kg and 7.1 g/kg, respectively) (STS, 1991).

MDNR did not accept the closure certification of Grede's hazardous waste treatment process, because the facility did not define the extent of contamination and remove all contaminated soils in the transfer area. The facility explained that the approved closure plan was followed and that the mixing truck could only have contaminated the ground below where it travelled. Grede is waiting for MDNR's final decision regarding closure approval (STS, 1992a).

On May 21, 1991, a semitrailer owned by one of the facility's suppliers tipped over on the southeast part of the facility. About 3 gallons of engine oil and radiator cooling fluid containing ethylene glycol was spilled onto an asphalt surface. The local fire department washed the area down with about 50 gallons of water. The runoff drained south, about 100 feet, to an unpaved area. On June 4, 1991, the area affected was estimated to be about 16 by 22 feet; the facility excavated to a depth of 8 inches, removing about 10 cubic yards of soil. This waste was transported off site and disposed of at Michigan Environs, Inc., type II landfill in Menominee, Michigan. After removing the soil, samples from five areas of the excavation were taken, composited into one sample, and analyzed for total petroleum hydrocarbons (TPH). TPHs were not detected in the analysis of the composited sample (Grede, 1991a).

2.5 REGULATORY HISTORY

Grede submitted a Notification of Hazardous Waste Activity form to EPA on August 15, 1980 (Grede, 1980a). Grede submitted a RCRA Part A permit application on November 28, 1980, that included treatment (T04) for 6,000 pounds per hour of cadmium (D006) and lead (D008) wastes (Grede, 1980b).

In November of 1980, the facility received EPA identification No. ILD 006 131 890. About 1 year later, the facility's EPA identification No. was corrected to indicate the state of Michigan: MID 006 131 890 (Grede, 1981).

In July 1985, the facility requested an exemption from hazardous waste permitting on the grounds that its treatment process constitutes a TET facility. The EPA refused Grede's request because the treatment process does not meet the definition of a TET process. The facility's system is not a TET process because the system is not made of impermeable materials and the discharge mechanism may not prevent releases of hazardous materials from the unit (EPA, 1985). Through several correspondences concerning the definition of a TET and Grede's treatment practices, Grede decided that in order to meet the TET exemption from hazardous waste permitting, it would need to redesign the treatment system so that treatment occurs in an enclosed environment before entering the baghouse. In January 1991, MDNR approved the sampling and analysis plan and the preliminary design of a new TET System (SWMU 11) (MDNR, 1991a). In August 1991, the TET System (SWMU 11) was put into operation, and MDNR accepted the as-built engineering drawings on March 16, 1992 (MDNR, 1992).

The facility is in the process of closing its Hazardous Waste Treatment System (SWMU 10) consisting of a baghouse auger, mixing truck, haul roads, and transfer area. On February 12, 1991, MDNR approved the closure plan subject to modifications (MDNR, 1991b). The facility used a steel mixing truck to treat cadmium (D006) and lead (D008) wastes generated from the cupola furnaces. The 9-cubic-yard mixing truck collected cupola emissions dust directly from the baghouse bins via augers. The mixing truck then drove around the facility haul roads, collecting dust from the dry dust collectors and waste foundry sand. The dust and waste foundry sand was mixed with the cupola emissions dust at a ratio of about 7 to 1. When full, the mixing truck was driven to the northeast part of the facility to the transfer area, a 6-foot-high earthen ramp with a 100-foot gravel access road. At the transfer area, treated cupola emissions dust was dumped into Semitrailers (SWMU 9) for transport to a landfill. Due to the hazardous constituents of the cupola emissions dust, MDNR requested that the baghouse auger, mixing truck, haul roads, and transfer area be decontaminated and remediated, before the TET System (SWMU 11) was installed. The baghouse auger, mixing truck, and paved haul roads were decontaminated and rinsate was collected and drummed. Chemical analysis of the rinsate showed low levels of cadmium and lead. The facility obtained permission to dispose of the rinsate in the sanitary sewer system that flows to the Kingsford Wastewater Treatment Facility. Grede emptied 42 drums of rinsate into the sanitary sewer system; a maximum of eight drums were emptied per day (STS, 1991).

Preliminary soil sample analysis from the earthen transfer area in the Hazardous Waste Treatment System (SWMU 10) indicated elevated levels of cadmium and lead. Levels of cadmium ranged from less than the method detection limit to 6.56 grams per kilogram (g/kg), and lead levels ranged from 3.4 to 133 g/kg. A minimum of 1 foot of soil was removed from the transfer area boundaries; in other places, soil was excavated until the color closely match the color of background soil samples. About 450 tons of contaminated soil was removed and transported by Gauthier to Michigan Environs type II landfill in Menominee. Two soil samples were collected after excavation to determine whether remediation activities were complete. Analysis of these soil samples indicated much lower levels of cadmium and lead. Cadmium levels ranged from less than the detection limit to 0.28 g/kg, and lead levels ranged from less than the detection limit to 7.13 g/kg (STS, 1991).

The MDNR did not accept the closure certification of Grede's hazardous waste treatment process because the facility did not define the extent of contamination and remove all contaminated soils in the transfer area as specified in the approved closure plan. Grede submitted a letter to MDNR clarifying the facility's interpretation of the work plan. The letter explained that the transfer area was defined by the actual road limits the mixing truck could traverse with the treated cupola emissions dust before the waste was loaded into the Semitrailers (SWMU 9). No additional remediation was completed. The facility is waiting for MDNR's final closure decision (STS, 1992a).

On May 23, 1985, the facility submitted a hydrogeologic study for a type III On-site Facility Landfill (SWMU 8). The area to be used for the landfill was purchased in the late 1970s and was an old borrow pit from which a considerable amount of sand and gravel fill had been removed (STS, 1985). In October 1986, MDNR approved Grede's request to dispose cupola emissions dust into SWMU 8 (MDNR, 1986b). MDNR stated that the procedure used to mix cupola dust with waste foundry sand does provide treatment beyond dilution. However, review of the leachate test results for this mixture determined that supplemental ground-water monitoring parameters were required. In addition to the approved list of ground-water monitoring parameters, quarterly analysis for dissolved manganese and formaldehyde were required. From August 21, 1986 to August 20, 1988, SWMU 8 was a permitted type III landfill with Michigan Permit No. 7214, (MDNR, 1990b).

In June 1989, MDNR denied Grede's renewal application for a solid waste disposal area operating license for the type III landfill filed in March 1989. In response, Grede sought a court order requiring that the Director of the MDNR issue Grede an operating license for the type III landfill (MDNR, 1990b). A counterclaim was filed in August 1989, in which MDNR alleged that Grede was operating the type III landfill without a valid operating license. The MDNR sought to close the landfill with the characterization of the contents and with studies to ascertain the nature and extent of any environmental impact caused by the landfill. Further correspondences between Grede and MDNR brought out Grede's failure to comply with various rules pertinent to hazardous waste management and eventually resulted in a Consent Judgement (MDNR, 1990b).

MDNR is still involved in litigation with Grede concerning closure of the type III On-Site Facility Landfill (SWMU 8), closure of the Hazardous Waste Treatment System (SWMU 10), and in-place abandonment of the former USTs below the pattern shop (AOC 1)(PRC, 1992e).

Grede was notified on October 31, 1991, that the facility was identified as a site of environmental contamination under the Michigan Environmental Response Act. The facility was to be listed on the Proposed List of Michigan Sites of Environmental Contamination scheduled for release in November 1991 (MDNR, 1991f). The facility was included on the site list only because of the concern with the Former USTs (AOC 1). Soil contamination below the tanks cannot be excavated because of the overlying pattern shop (MDNR, 1991d).

In the past, Grede has had RCRA compliance problems. MDNR conducted RCRA compliance inspections on June 20, 1985; July 5, 1986; October 13, 1987; August 17, 1988; September 26, 1989; September 14, 1990; and September 6, 1991 (MDNR, 1985, 1986a, 1987, 1988, 1989, 1990a and 1991c). Inspectors noted violations in 1986, 1987, 1988, and 1989. Violations were related to the contingency plan, container management, waste analysis plan, biennial reports, and financial assurance for closure. Grede responded to all violations with corrective actions.

The facility is required to have operating air permits. Grede's State of Michigan air permits and corresponding sources are presented in Table 3. In the past, the facility has had air permit compliance problems related to fugitive dust control (PRC, 1992b). The facility has no history of odor complaints from area residents.

The facility is not required to have a National Pollutant Discharge Elimination System (NPDES) permit or a sanitary sewer discharge permit.

2.6 ENVIRONMENTAL SETTING

This section describes the climate; flood plain and surface water; geology and soils; and ground water in the vicinity of the facility.

2.6.1 Climate

The climate in Dickinson County is temperate. The average daily temperature is 41.7° Fahrenheit (°F); the lowest average daily temperature is 13.1°F in January; the highest average daily temperature is 67.2°F in July. The average annual snow fall is about 63 inches (PRC, 1992c).

TABLE 3

GREDE AIR PERMITS

State of Michigan Air Permit Number	Source
52-92	Cupola
358-776	Core machine and gas scrubber
1238-91	Bulk Portland cement system for TET
951-78	Core machine area
609-82	Two ton furnace
162-77	Main plant sand system
319-77	Cleaning room dry dust collectors
661-79	Chipping/grinding area dry dust collectors
1005-78	Wet dust collector
134-78	Wet collector system
829-77	Mold dumping conveyor
395-74	Module molding system
396-74	Module molding system

The total annual precipitation for the county is 31 inches (DOC, 1968a). The mean annual lake evaporation for the area is about 25 inches (DOC, 1968b). The average 1-year, 24-hour maximum rainfall is about 2 inches (DOC, 1963). The prevailing wind is from the west northwest; average annual wind speed is about 11 miles per hour (PRC, 1992d).

2.6.2 Flood Plain and Surface Water

The Grede facility is not located in a 100-year flood plain (PRC, 1992f). The nearest surface water body, Crystal Lake, is about 4,000 feet northwest of the facility and is used for recreation. Additional surface water bodies include Powder Lakes, about 5,000 feet to the east, and the Menominee River, about 1 mile southwest of the facility (USGS, 1982). The Menominee River is used for recreational purposes and discharges to Green Bay, about 85 stream miles southeast of the facility.

The natural topography of the facility around the foundry building is relatively flat with elevations ranging from 1,100 to 1,116 feet above mean sea level (STS, 1991). The facility property slopes generally to the west. All surface drainage at the facility is controlled by a combined storm and sanitary sewer system that leads to the Iron Mountain/Kingsford Sewage Disposal Treatment Plant. The facility recently incorporated additional storm sewers into its drainage system.

2.6.3 Geology and Soils

Soil borings at the facility encountered granular soils consisting of fine sands, fine to coarse sands, and silty fine sands. In general, the granular deposits were in a medium dense condition to a depth of about 20 feet, and in a dense to extremely dense condition to 80 feet. Laboratory permeability test on the silty sands indicated a coefficient permeability of 4×10^{-6} centimeters per second (cm/sec). A permeability test performed on the fine to medium sands indicated a permeability of 1×10^{-4} cm/sec (STS, 1985).

The local geology of the Kingsford area consists of glacially deposited surficial material overlying pre-Cambrian bedrock. The pre-Cambrian bedrock consists of slate and interbedded quartzites. The glacial deposits appear to be the results of outwash deposition in a glacially incised bedrock valley. Directly overlying the bedrock is a layer of highly compacted clay with matrix-supported cobbles and boulders. This clay may represent ground moraine deposited beneath advancing glaciers. Above this ground moraine, a layer of very fine to coarse sand, which appears to represent outwash material and more recent alluvium, has filled the glacial valley. The thickness of the glacially deposited material varies from a few feet over bedrock topographic highs, located east and north of Kingsford, to between 100 and 200 feet near the Menominee River. The thickness of the outwash deposits at the Grede facility varies from 130 to 140 feet (STS, 1992b).

2.6.4 Ground Water

The hydrogeology below the facility is controlled primarily by the glacially deposited surficial material that overlies bedrock. The surficial aquifer consists of outwash material containing saturated sand, gravel, and silt. The aquifer thickens toward the Menominee River as the glacial deposits thicken. In general, glacial outwash typically has a moderate to high permeability, characteristic of coarse and well sorted sediment. However, abrupt facies changes are common because silt and clay layers may be present. These silt and clay layers are typically less permeable than the sand and affect the movement of ground water through the outwash deposits by decreasing the saturated thickness and permeability. The depth of ground water is between 40 to 60 feet below ground surface (bgs). Regional ground-water flow appears to be to the south and southwest toward the Menominee River (STS, 1992b). The hydraulic conductivity for the outwash was estimated to be about 15 feet per year (STS, 1985).

The City of Kingsford currently operates ground-water production wells for its municipal water supply. These wells are located along the eastern edge of the Kingsford/Iron Mountain airport, located about 2.5 miles northwest of the facility. The drilling logs of the Kingsford Municipal Supply Wells indicate that the maximum depth of these wells is 98 feet, with well diameters ranging from 12 to 16 inches. Static water levels in these wells are roughly 50 feet bgs. The aquifer these wells are screened in appears to be comprised of sand and gravel. Potential recharge sources for the municipal wells include the Menominee River, Crystal Lake, and infiltration of precipitation upgradient of the wells (STS, 1992b).

2.7 RECEPTORS

The facility occupies 72 acres in a mixed-use area in Kingsford, Michigan. Kingsford has a population of about 5,480.

The facility is bordered on the north by an automobile dealership and a cemetery; on the west by Carpenter Avenue, a fast-food restaurant, and a church; on the south by Breitung Avenue and residences; and on the east by Iron Mountain Woodlands. The Escanaba Railroad separates the landfill from the foundry building. The nearest school, Garden Village School, is located about 700 feet south of the facility. Facility access is controlled by 24-hour surveillance and a 6-foot-high fence that surrounds the facility. The landfill has a separate access gate that is locked at all times and is also surrounded by a 6-foot-high fence.

The nearest surface water body, Crystal Lake, is located about 4,000 feet northwest of the facility and is used for recreational purposes. Other surface bodies in the area include Powder Lakes, about 5,000 feet to the east, and the Menominee River, about 1 mile southwest of the facility. The Menominee River is used for recreational purposes and discharges to Green Bay, about 85 stream miles to the southeast of the facility.

Ground water in the area is used as a municipal water supply. Drinking water wells for Kingsford are located about 2.5 miles northwest and upgradient from the facility. No industrial wells are located within 2 miles of the facility (PRC, 1992f).

Sensitive environments are not located on site. The nearest sensitive environment, a wetland area around Crystal Lake, is located about 4,000 feet northwest of the facility. Another wetland along the Menominee River is located about 1 mile southwest of the facility. Two endangered species inhabit Dickinson County, the gray wolf and the bald eagle (DOI, 1989).

3.0 SOLID WASTE MANAGEMENT UNITS

This section describes the eleven SWMUs identified during the PA/VSI. The following information is presented for each SWMU: description of the unit, dates of operation, wastes managed, release controls, history of documented releases, and PRC's observations. Figure 2 shows the SWMU locations.

SWMU 1	**North Foundry Waste Bunker**
Unit Description:	The North Foundry Waste Bunker is located outdoors to the northeast of the foundry. The 12- by 40-foot unit is used to store nonhazardous foundry wastes. The unit is made of reinforced concrete with 4-foot-high containment walls on three sides. The floor slopes 4 inches in 12 feet to the back of the unit. The unit is not covered or drained. Foundry wastes are dumped from hoppers into the unit; when full, a front-end loader is used to move the foundry wastes from the unit into a transporter haul truck for transport to a type II landfill.
Date of Startup:	This unit began operation at the beginning of 1992.
Date of Closure:	This unit is active.
Wastes Managed:	This unit manages foundry wastes, which include slag, waste refractory, broken cores, core butts, and waste sands. Wastes from this unit are ultimately disposed of in a type II landfill.
Release Controls:	The unit consists of a sloped concrete floor with 4-foot-high containment walls on three sides. The unit has no drains or cover.
History of Documented Release:	No releases from this unit have been documented.
Observations:	During the VSI, the unit contained cooled slag and waste sand. Molten slag is brought out to the unit in small hoppers and allowed to cool. PRC observed two hoppers of cooling slag located just north of the unit. PRC noted a large puddle of rain water in front

of the unit, and the area around the unit was not paved (see Photograph No. 1).

SWMU 2	**South Foundry Waste Bunker**
Unit Description:	The South Foundry Waste Bunker is located outdoors southeast of the foundry. The 24- by 30-foot unit is used to store nonhazardous foundry wastes. The unit is made of reinforced concrete with 12-foot-high walls on three sides. The floor slopes 2 feet in 24 feet to the back of the unit. The unit has a corrugated steel roof, and no drains. Foundry wastes are dumped from hoppers into the unit. When full, a front-end loader is used to move the foundry wastes from the unit into a transporter haul truck for transport to a type II landfill.
Date of Startup:	The unit began operation in mid-1990.
Date of Closure:	This unit is active.
Wastes Managed:	This unit manages foundry wastes, which include waste sands, broken cores, core butts, and sludge.
Release Controls:	The unit consists of a sloped concrete floor with 12-foot high walls on three sides. The unit has a corrugated steel roof and no drains.
History of Documented Release:	No releases from this unit have been documented.
Observations:	During the VSI, the unit contained broken cores, core butts, and waste sands. PRC observed that the area in front of the unit was covered with mud (see Photographs No. 2 and 3).
SWMU 3	**Satellite Foundry Waste Hoppers**
Unit Description:	The Satellite Foundry Waste Hoppers are located throughout the plant to collect nonhazardous foundry wastes. Each hopper has a capacity of about 0.5 cubic yards. The units are constructed of steel with 4 wheels. Some of the units are filled from 5-gallon

buckets used to collect wastes from the production areas. Other units are filled directly by either a conveyor or a steel chute.

Date of Startup: The date this unit began operating is not known. Satellite accumulation has been used since the foundry started.

Date of Closure: The unit is active.

Wastes Managed: The unit manages foundry wastes, which include sludge, waste refractory, broken cores, core butts, sludge, dust, and waste foundry sands. Wastes from these units are dumped into either SWMU 1 or 2.

Release Controls: These units had no release controls.

History of Documented Release: No releases from these units have been documented.

Observations: During the VSI, the units contained broken cores, core butts, and waste refractory. PRC noted no evidence of release (see Photographs No. 4 and 5).

SWMU 4 **Wheelabrator Waste Sand Hopper**

Unit Description: The Wheelabrator Waste Sand Hopper is located indoors along the north wall of the foundry. The unit is used to store nonhazardous sand removed from molded iron products in the wheelabrator and shotblaster. The steel unit has a capacity of about 12 cubic yards. Waste sand is brought to the unit via an overhead conveyor. The unit and the drop chute are enclosed to reduce dust emissions. Wastes from this unit are mixed with the cupola emissions dust and waste foundry sand in the mixing truck and stored in Semitrailers (SWMU 9) until disposal in a type II landfill.

Date of Startup: This unit began operation in 1982.

Date of Closure: This unit is active.

Wastes Managed:	This unit manages nonhazardous waste sand from the wheelabrator and shotblaster and dust from the dry dust collectors. The wheelabrator and shotblaster remove excess sand from molded iron products.
Release Controls:	The unit and drop chute are covered to reduce dust emissions.
History of Documented Release:	No releases from this unit have been documented.
Observations:	During the VSI, the unit was in operation. PRC noted no evidence of release (see Photograph No. 6).
SWMU 5	**Main Plant Waste Storage Area**
Unit Description:	The Main Plant Waste Storage Area is located outdoors along the southeast foundry wall. The unit is used to store nonhazardous wastes. The unit measures 18 by 24 feet and has a 7-foot-high steel wall on two sides and is not covered. The foundry building acts as the third wall. The floor of the unit and the surrounding area is concrete. The unit is not drained. Overhead conveyors and metal drop chutes transport wastes to the unit from throughout the facility. When full, a front-end loader dumps the waste into either the South Foundry Waste Bunker (SWMU 2) or directly into a transporter haul truck for transport to a type II landfill.
Date of Startup:	This unit began operation in 1978.
Date of Closure:	This unit is active.
Wastes Managed:	This unit manages nonhazardous waste foundry sand and core butts from the main plant. Wastes from this unit are ultimately transported to a type II landfill.
Release Controls:	The unit has a concrete floor and containment walls on three sides.
History of Documented Release:	No releases from this unit have been documented.

Observations:	During the VSI, the unit contained very little waste sand and core butts. PRC noted no evidence of release (see Photograph No. 7).
SWMU 6	**Module Molding Process Waste Hopper**
Unit Description:	The Module Molding Process Waste Hopper is located outdoors along the southeast foundry wall. The metal unit has a capacity of about 8 cubic yards. The unit is used to store nonhazardous wastes, which are brought to the unit via an overhead conveyor and a metal drop chute. The unit and drop chute are enclosed.
Date of Startup:	The date this unit began operating is not known.
Date of Closure:	The unit is active.
Wastes Managed:	The unit manages nonhazardous system sand and core butts from the module molding process. When full, the unit is transported directly to the type II landfill for disposal of the waste.
Release Controls:	The unit and drop chute have a metal cover to reduce dust emissions.
History of Documented Release:	No releases from this unit have been documented.
Observations:	During the VSI, the unit was in operation. PRC noted no evidence of release (see Photograph No. 8).
SWMU 7	**Core Oil Bunker**
Unit Description:	The Core Oil Bunker is located outdoors between the Main Plant Waste Storage Area (SWMU 5) and the Module Molding Process Waste Hopper (SWMU 6). The unit is an aboveground storage tank containment bunker used to store PCB capacitors and transformers in containers on the floor on the unit. The unit measures 16 by 27 feet and has 3-foot-high containment walls on all sides. The unit is made of reinforced concrete and is not covered.

Date of Startup: This unit began operation in 1983.

Date of Closure: This unit is active.

Wastes Managed: This unit manages PCB capacitors and transformers that have been removed from operation. Wastes are managed in containers. Wastes from the unit are incinerated by Aptus in Coffeyville, Kansas.

Release Controls: The unit has a concrete floor and containment walls on all sides and is not drained.

History of Documented Release: No releases from this unit have been documented.

Observations: During the VSI, the unit did not contain any PCB waste. PRC noted a large volume of water in the unit (see Photographs No. 9 and 10).

SWMU 8 **On-Site Facility Landfill**

Unit Description: The landfill is located northeast of the foundry building. The facility purchased the area in the late 1970s. Before that time, the land was used as a gravel pit. From September 1986 to July 1990, the unit was used to dispose all of the foundry wastes. The unit was licensed as a type III landfill with Michigan permit No. 7214. The design of the type III landfill did not require a lining or leachate collection system. During operation, about 56,000 cubic yards of waste was disposed of, covering 3.5 acres of the 28 acre area to a depth of about 10 feet.

Date of Startup: This unit began operation in September 1986.

Date of Closure: This unit has been inactive since July 1990 and is undergoing closure.

Wastes Managed: This unit managed hazardous cupola emissions dust (D006 and D008) which was treated prior to disposal to render it nonhazardous, and nonhazardous waste foundry sand, slag, sludge, waste refractory, broken cores, and core butts. Waste foundry sand containing bentonite was mixed with the cupola emissions dust at a ratio of about 7 to 1. The resulting mixture no longer met EPA Hazardous waste criteria.

Release Controls: This unit had no release controls.

History of Documented Release: No releases from this unit have been documented.

Observations: During the VSI, the unit was being covered. PRC noted no evidence of release (see Photograph No. 11).

SWMU 9 **Semitrailers**

Unit Description: The Semitrailers are stored between the On-Site Facility Landfill (SWMU 8) and the foundry building. The units are used to accumulate and transport nonhazardous waste. Each unit is capable of holding 20 tons of waste. The units are made of steel and have a canvas cover for transportation to a type II landfill. The units are leased from Gauthier, the transporter.

Date of Startup: This unit began operation in 1972.

Date of Closure: This unit is active.

Wastes Managed: This unit manages nonhazardous cupola emissions dust from the TET system and waste foundry sand. Moist foundry sand and dust are added to the cupola emissions dust for dust control during transport and disposal at the landfill.

Release Controls: The units have canvas covers.

History of Documented Release: No releases from this unit have been documented.

Observations: During the VSI, one unit was empty, and another unit was nearly full of cupola emissions dust. PRC noted no evidence of release (see Photographs No. 12, 13, and 14).

SWMU 10 **Hazardous Waste Treatment System**

Unit Description: The Hazardous Waste Treatment System consists of four components: baghouse auger; mixing truck; haul roads; and transfer area. The 9-cubic-yard steel mixing truck collected cupola emissions dust directly from the baghouse bins via augers. The mixing truck drove around the facility haul roads collecting dust from the dry dust collectors and waste foundry sand at a ratio of 7 to 1. At the transfer area, the treated cupola emissions dust was dumped into the Semitrailers (SWMU 9) for transport to a landfill for disposal. This unit is currently used to transfer nonhazardous cupola emissions dust to the Semitrailers (SWMU 9).

Date of Startup: This unit began operation in about 1972.

Date of Closure: This unit is active and is currently going through closure. The unit is inactive as a hazardous waste management unit.

Wastes Managed: This unit currently manages cupola emissions dust (D006 and D008) which was treated in the TET System (SWMU 11) to render it nonhazardous. The unit formerly treated the cupola emissions dust (D006 and D008) to render it nonhazardous prior to disposal in a landfill.

Release Controls: The baghouse augers were enclosed in a bin and the mixing truck was a closed vessel. The haul roads and transfer area have no release controls.

History of Documented Release: During closure of the unit, preliminary soil sample analysis revealed elevated levels of cadmium and lead, 6.56 g/kg and 133 g/kg respectively, in the surface soil surrounding the transfer area. One foot or 450 tons of contaminated topsoil was removed from the transfer area. Additional soil samples of the excavation revealed lower levels of cadmium and lead, 0.28 g/kg and 7.1 g/kg, respectively.

Observations:	During the VSI, PRC noted no evidence of release (see Photograph No. 15).
SWMU 11	**Totally Enclosed Treatment (TET) System**
Unit Description:	The TET System is located on the north side of the facility. The unit treats cupola emissions dust (D006 and D008) to render the waste nonhazardous before collection in the baghouse. The unit adds Portland cement and soda ash to the waste stream, in an injection box. A chemical reaction occurs that bonds the hazardous constituents of the waste stream.
Date of Startup:	This unit began operation in August 1991.
Date of Closure:	This unit is active.
Wastes Managed:	This unit treats cupola emission dust (D006 and D008) to render the waste nonhazardous.
Release Controls:	The process occurs within closed duct work.
History of Documented Release:	No releases have been documented.
Observations:	During the VSI, the unit was in operation. PRC noted no evidence of release. No photograph was taken of the unit.

4.0 AREAS OF CONCERN

PRC identified one AOC during the PA/VSI. This AOC is discussed below; its location is shown in Figure 2.

AOC 1 Former Underground Storage Tanks (USTs)

The Former USTs were found to have leaked after in-place abandonment in early July 1990. The unit consisted of two 12,000-gallon railroad tank cars buried outside the northeast corner of the foundry building in about 1955. About 6 years later, a pattern shop was built over the tanks. The tanks stored core oil and parting oil used in the metal casting process. The units were abandoned because the facility replaced them with aboveground storage tanks. The units were abandoned in place, due to their location below the pattern shop. The tanks were cleaned and filled with sand and a sandy clay mixture between July 2 and 9, 1990. Soil sample analysis indicated contamination under the south end of the tanks. Seven carcinogenic PAHs were identified in the soil with concentrations ranging from 95 to 2,600 μg/kg. Ground-water monitoring wells detected tetrachloroethylene and 1,1,1-trichloroethane with concentrations of 1.6 and 1.5μg/L, respectively. Excavation of the soil was not possible due to the location below the pattern shop's concrete floor. The facility continues to monitor contaminant migration in the ground water (MDNR, 1991e) (see Photograph No. 16).

5.0 CONCLUSIONS AND RECOMMENDATIONS

The PA/VSI identified eleven SWMUs and one AOC at the Grede facility. Background information on the facility's location; operations; waste generating processes and waste management practices; history of documented releases; regulatory history; environmental setting; and receptors is presented in Section 2.0. SWMU-specific information, such as the unit's description, dates of operation, wastes managed, release controls, history of documented releases, and observed condition, is presented in Section 3.0. The AOC is discussed in Section 4.0. Following are PRC's conclusions and recommendations for each SWMU and AOC. Table 4, at the end of this section, summarizes the SWMUs and AOC at the facility and the recommended further actions.

SWMU 1 **North Foundry Waste Bunker**

Conclusions: The unit is an outdoor, concrete, containment bunker with a floor that slopes slightly to the back of the unit. The unit manages nonhazardous foundry wastes, such as waste foundry sand, slag, waste refractory, broken cores, and core butts. The unit has a low potential for release to ground water, surface water, air, and on-site soils.

Recommendations: PRC recommends no further action for this SWMU at this time.

SWMU 2 **South Foundry Waste Bunker**

Conclusions: The unit is an outdoor, concrete, containment bunker with a floor that slopes to the back of the unit. The covered unit manages nonhazardous foundry wastes, such as waste foundry sand, sludge, broken cores, and core butts. The unit has a low potential for release to ground water, surface water, air, and on-site soils.

Recommendations: PRC recommends no further action for this SWMU at this time.

SWMU 3 **Satellite Foundry Waste Hoppers**

Conclusions: These units are 0.5-cubic-yard steel hoppers located throughout the plant. The units manage nonhazardous foundry waste such as slag, waste refractory, sludge, dust, waste foundry sands, broken cores, and core butts.

The unit has a low potential for release to ground water, surface water, air, and on-site soils.

Recommendations: PRC recommends no further action for this SWMU at this time.

SWMU 4 **Wheelabrator Waste Sand Hopper**

Conclusions: This unit is an enclosed, indoor, steel hopper used to collect nonhazardous waste sand and shot from the cleaning of castings and dust from the dry dust collectors. The unit has a low potential for release to ground water, surface water, air, and on-site soils.

Recommendations: PRC recommends no further action for this SWMU at this time.

SWMU 5 **Main Plant Waste Storage Area**

Conclusions: The unit is an uncovered, outdoor, concrete pad with containment walls on three sides. The unit manages nonhazardous waste foundry sand and core butts. The unit has a low potential for release to ground water, surface water, air, and on-site soils.

Recommendations: PRC recommends no further action for this SWMU at this time.

SWMU 6 **Module Molding Process Waste Hopper**

Conclusions: The unit is an enclosed outdoor hopper that manages nonhazardous system sand and core butts. The unit has a low potential for release to ground water, surface water, air, and on-site soils.

Recommendations: PRC recommends no further action for this SWMU at this time.

SWMU 7 **Core Oil Bunker**

Conclusions: The unit is an outdoor, aboveground storage tank containment bunker. The unit is occasionally used to store PCB capacitors and transformers that have been removed from operation. The unit has a low potential for release to ground water, surface water, air, and on-site soils.

Recommendations: PRC recommends that the inside of the unit be kept dry.

SWMU 8 **On-Site Facility Landfill**

Conclusions: The unit was a licensed type III landfill used to dispose of all the facility-generated foundry wastes. Ground-water monitoring wells have not detected any contamination below the unit. The unit has a moderate potential for release to ground water and on site soils because the unit is not lined. The unit has a low potential for release to surface water and air because the wastes contained in the unit are below the soil surface.

Recommendations: PRC recommends that the facility continue monitoring ground water for possible contaminant migration. PRC also recommends that closure activities continue as scheduled.

SWMU 9 **Semitrailers**

Conclusions: These units are 20-ton-capacity semitrailers with canvas covers that accumulate and transport nonhazardous cupola emissions dust to a type II landfill. These units have a low potential for release to ground water, surface water, air, and on-site soils.

Recommendations: PRC recommends no further action for this SWMU at this time.

SWMU 10 **Hazardous Waste Treatment System**

Conclusions: Grede is in the process of closing this unit. MDNR will not approve closure of the unit until the extent of contamination in the transfer area is defined. The potential for release to environmental media is summarized below.

Ground Water: The potential for release is moderate. After remediation of the transfer area, lead contamination of the soil persists at a concentration of 7.1 g/kg.

Surface Water: The potential for release is low. The extent of the contamination appears to be limited to the surface soil surrounding the transfer area. Runoff from the transfer area would go to the Iron Mountain/Kingsford combined sewer system.

Air: The potential for release is low. The extent of the contamination appears to limited to the surface soil surrounding the transfer area.

On Site Soils: Elevated levels of cadmium and lead contamination have been detected in surface soil surrounding the transfer area.

Recommendations: PRC recommends that facility define the extent of the cadmium and lead contamination in the transfer area and remediate contaminated soils.

SWMU 11 **TET System**

Conclusions: The unit treats hazardous cupola emissions dust in a closed system to render the waste nonhazardous before collection in the baghouse. The unit has a low potential for release to ground water, surface water, air, and on-site soils.

Recommendations: PRC recommends no further action for the SWMU at this time.

AOC 1 **Former Underground Storage Tanks**

Conclusions: These units stored parting oil and core oil from 1955 to their in-place abandonment in July 1990. Seven carcinogenic PAHs were identified in the surrounding soil and tetrachloroethylene and 1,1,1-trichloroethane were detected in ground water below these units. Excavation of the soil was not possible due to the tanks' location below the pattern shop's concrete floor. The potential for release to environmental media is summarized below.

Ground Water: Ground-water monitoring wells surrounding these units detected tetrachloroethylene and 1,1,1-trichloroethane, with concentrations of 1.6 and 1.5 μg/L, respectively.

Surface Water: The potential for release is low. Contamination is contained below the concrete floor of the pattern shop.

Air: The potential for release is low. Contamination is contained below the concrete floor of the pattern shop.

On-Site Soils: Seven carcinogenic PAHs were identified in the soil surrounding the units with concentrations ranging from 95 to 2,600 μg/kg.

Recommendations: PRC recommends that the facility continue monitoring ground water for possible contaminant migration.

ENFORCEMENT CONFIDENTIAL

TABLE 4
SWMU AND AOC SUMMARY

SWMU	Dates of Operation	Evidence of Release	Recommended Further Action
1. North Foundry Waste Bunker	1992 to Present	None	None
2. South Foundry Waste Bunker	1990 to Present	None	None
3. Satellite Foundry Waste Hoppers	Unknown to Present	None	None
4. Wheelabrator Waste Sand Hopper	1982 to Present	None	None
5. Main Plant Waste Storage	1978 to Present	None	None
6. Module Molding Process Waste Hopper	Unknown to Present	None	None
7. Core Oil Bunker	1983 to Present	None	Keep the inside of the unit dry
8. On-Site Facility Landfill	1986 to 1990	None	Continue ground-water monitoring and closure activities
9. Semitrailers	1972 to Present	None	None
10. Hazardous Waste Treatment System	1972 to Present	Cadmium and lead detected in surface soil of transfer area	Define extent of contamination and remediate
11. TET System	August 1991 to Present	None	None

AOC	Dates of Operation	Evidence of Release	Recommended Further Action
1. Former Underground Storage Tanks	1955 to 1990	Contaminated soil and ground water	Continue ground-water monitoring

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Grede, 1980b. RCRA Part A Permit Application, EPA Forms 3510-1 and 3510-3, November 28.

Grede, 1981. Letter from James T. Williams, Vice President, to Karl J. Klepitsch, Jr., Chief, Waste Management Branch, EPA, October 2.

Grede, 1986. Letter from David Van Dyke, Director of Safety and Environmental Protection, to Randi Kim, EPA, June 4.

Grede, 1991a. Letter from Ronald L. Olson, Manager of Environmental and Plant Engineering, to Robert Schmeling II, Regional Supervisor, MDNR, July 2.

Grede, 1991b. Letter from James O. White, Director of Environmental Engineering, to Robert Schmeling II, Regional Supervisor, MDNR, September 10.

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MDNR, 1986a. Letter from Thomas M. Polasek, District Supervisor, to David Van Dyke, Grede Foundry (Grede), August 13.

MDNR, 1986b. Letter from Earle H. Olsen, Marquette District Supervisor, to David Van Dyke, Grede, October 29.

MDNR, 1987. Letter from Robert Schmeling II, Regional Supervisor, to David Van Dyke, Grede, October 19.

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MDNR, 1991a. Letter from Alan J. Howard, Chief, Waste Management Division, to James O. White, Director of Environmental Engineering, Grede, January 18.

MDNR, 1991b. Letter from the MDNR, Lansing Michigan, to James O. White, Director of Environmental Engineering, Grede, February 12.

MDNR, 1991c. Letter from Leonard Switzer, Engineer, to Ronald Olson, Manager of Environmental and Plant Engineering, Grede, September 16.

MDNR, 1991d. Interoffice Communication from Mark Petrie, Geologist, to Hank Switzer, Environmental Engineer, MDNR, September 16.

MDNR, 1991e. Site Summary Prepared by Mark Petrie, Geologist, Environmental Response Division, September 17.

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MDNR, 1992. Letter from Dennis M. Drake, Acting Chief, Waste Management Division, to James O. White, Director of Environmental Engineering, Grede, March 16.

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PRC, 1992b. Record of Telephone Conversation between Keith Foszcz and Warren Dellis, MDNR Air Quality Division, July 13.

PRC, 1992c. Facsimile sent to Keith Foszcz from Walt Summers, Soil Conservation Service, July 13.

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ATTACHMENT A
VISUAL SITE INSPECTION SUMMARY AND PHOTOGRAPHS

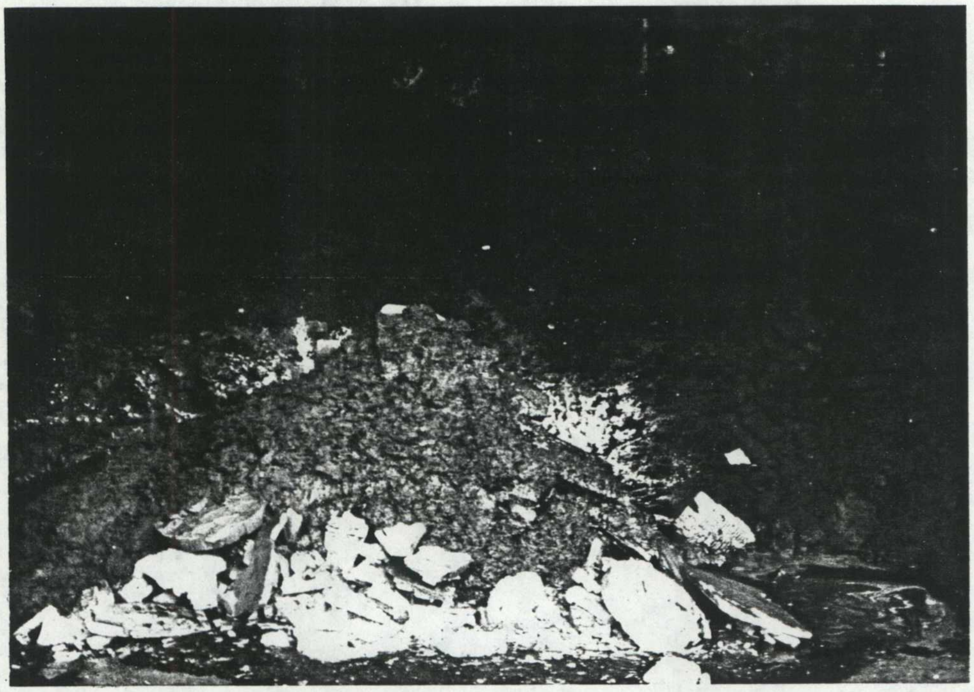
VISUAL SITE INSPECTION SUMMARY

Grede Foundries, Inc. (Grede)
Kingsford, Michigan 49801
MID 006 131 890

Date:	June 24, 1992
Primary Facility Representative: Representative Telephone No.:	Ronald L. Olson, Plant Engineering Manager (Grede) (906) 774-7250
Inspection Team:	Keith Foszcz, PRC Environmental Management, Inc. (PRC) Jeff Swano (PRC)
Photographer:	Jeff Swano, PRC
Weather Conditions:	Calm, overcast; temperature about 60°F
Summary of Activities:	The visual site inspection (VSI) began at 8:05 with an introductory meeting. The inspection team explained the purpose of the VSI and the agenda for the visit. Facility representatives then discussed the facility's past and current operations, solid wastes generated, and release history. Facility representatives provided the inspection team with copies of requested documents. The VSI tour began at 10:45 a.m. Mr. Olson discussed specific operations conducted in each area as the tour progressed. PRC inspected waste bunkers, waste hoppers, satellite waste hoppers, storage areas, the semitrailer transfer area, and the on-site facility landfill. PRC photographed ten out of 11 SWMUs and one AOC. The tour concluded at 12:10 p.m., after which the inspection team held an exit meeting with facility representatives. The VSI was completed and the inspection team left the facility at 12:30 p.m.

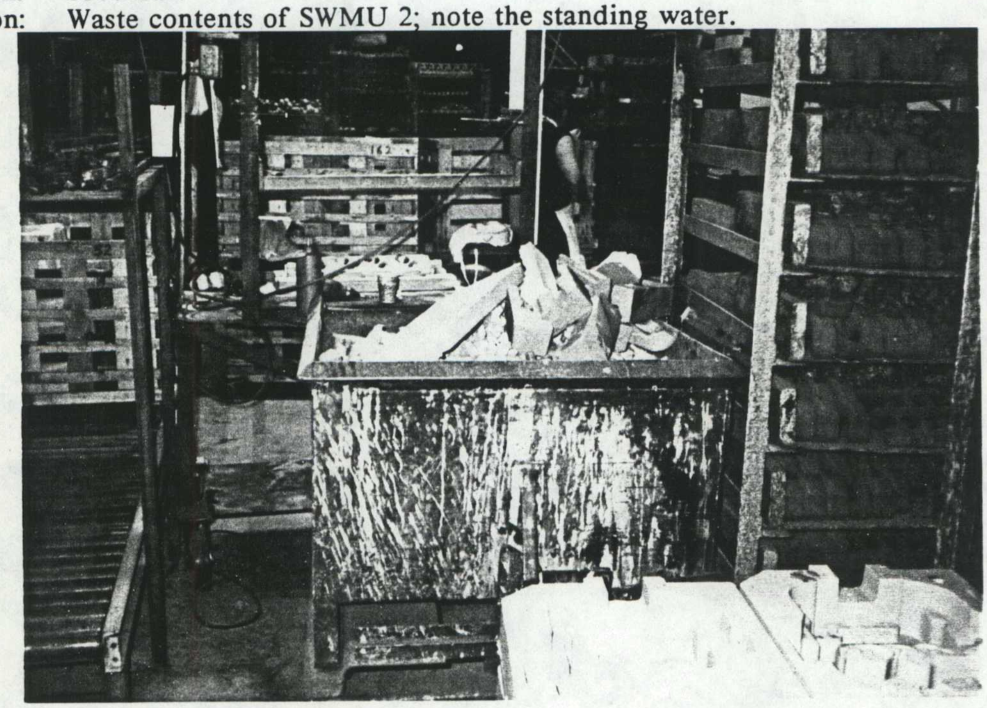
Photograph No. 1 Location: SWMU 1
Orientation: East Date: June 24, 1992
Description: The North Foundry Waste Bunker is used to accumulate foundry wastes, sand, cores, and waste refractory. Slag is cooled in SWMU 3, just north of this unit, before it is dumped into the unit. Note the large puddle of rainwater in the foreground.

Photograph No. 2 Location: SWMU 2
Orientation: Southeast Date: June 24, 1992
Description: The South Foundry Waste Bunker is used to store foundry wastes, sand, cores, and sludge.



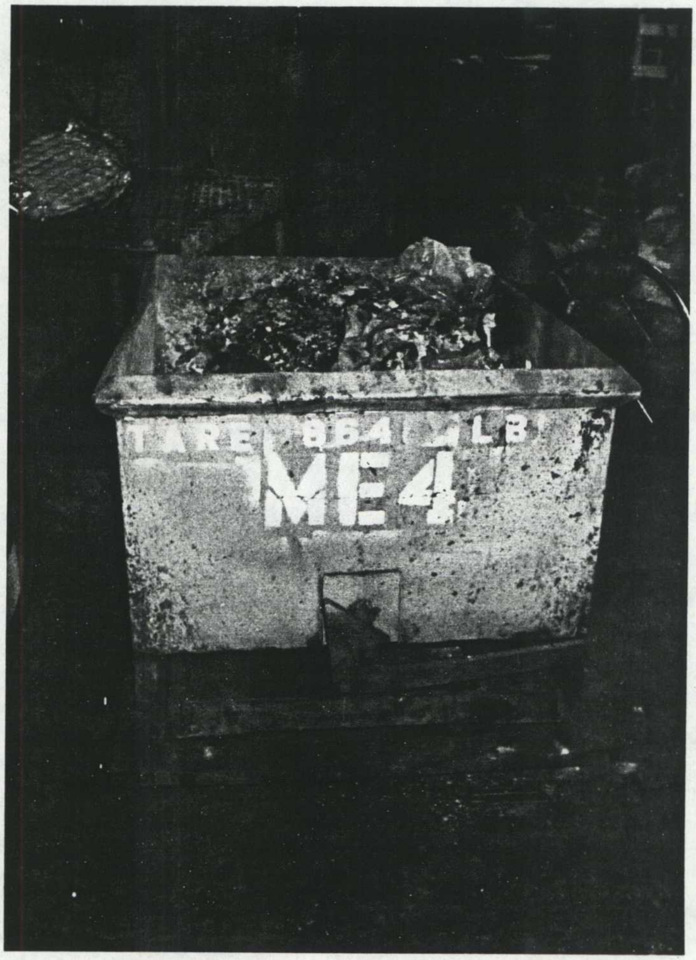
Photograph No. 3
Orientation: Southeast
Description: Waste contents of SWMU 2; note the standing water.

Location: SWMU 2
Date: June 24, 1992

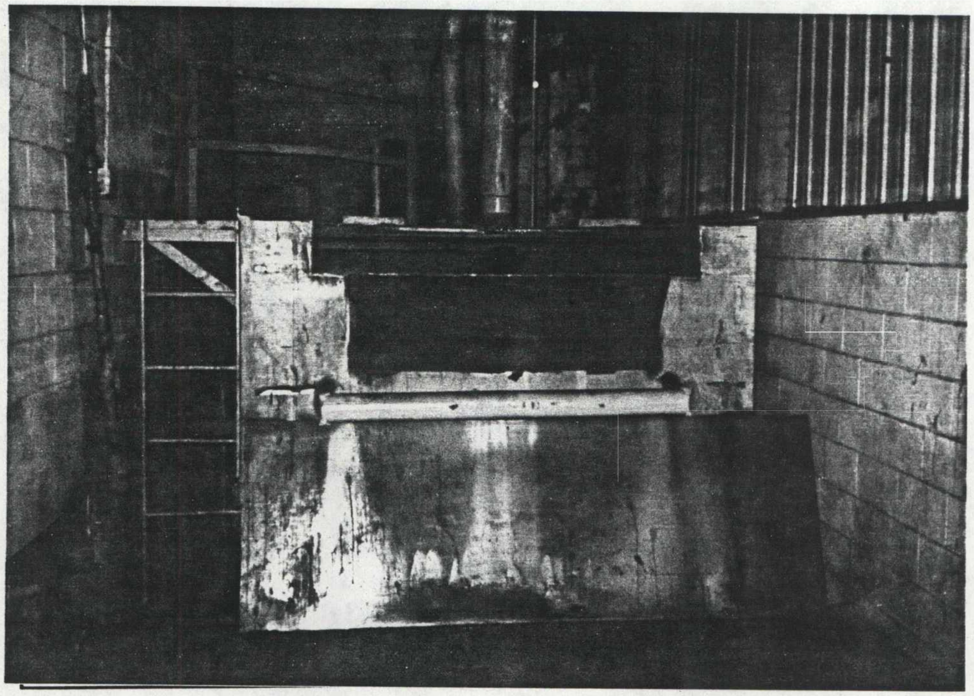


Photograph No. 4
Orientation: South
Description: Satellite Foundry Waste Hoppers full of broken cores

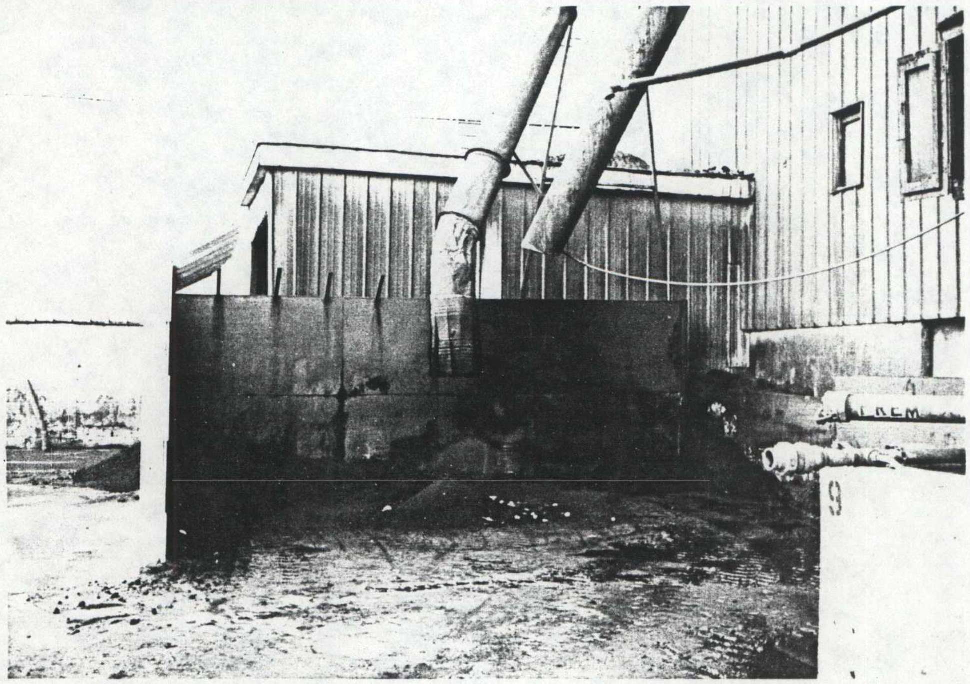
Location: SWMU 3
Date: June 24, 1992



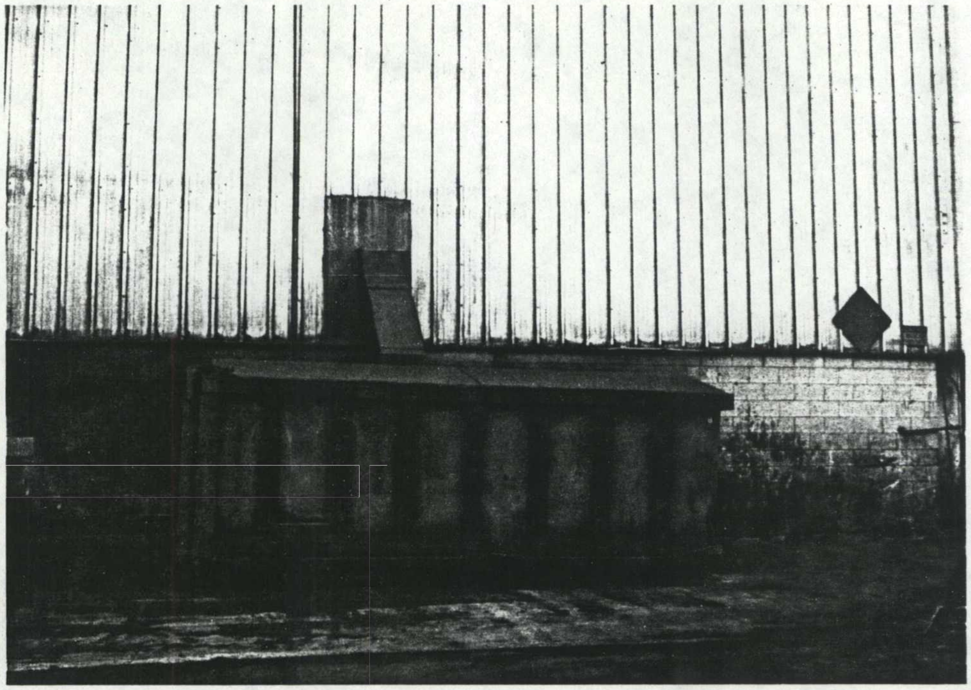
Photograph No. 5 Location: SWMU 3
Orientation: East Date: June 24, 1992
Description: Another Satellite Foundry Waste Hopper with waste refractory removed from the ladle.



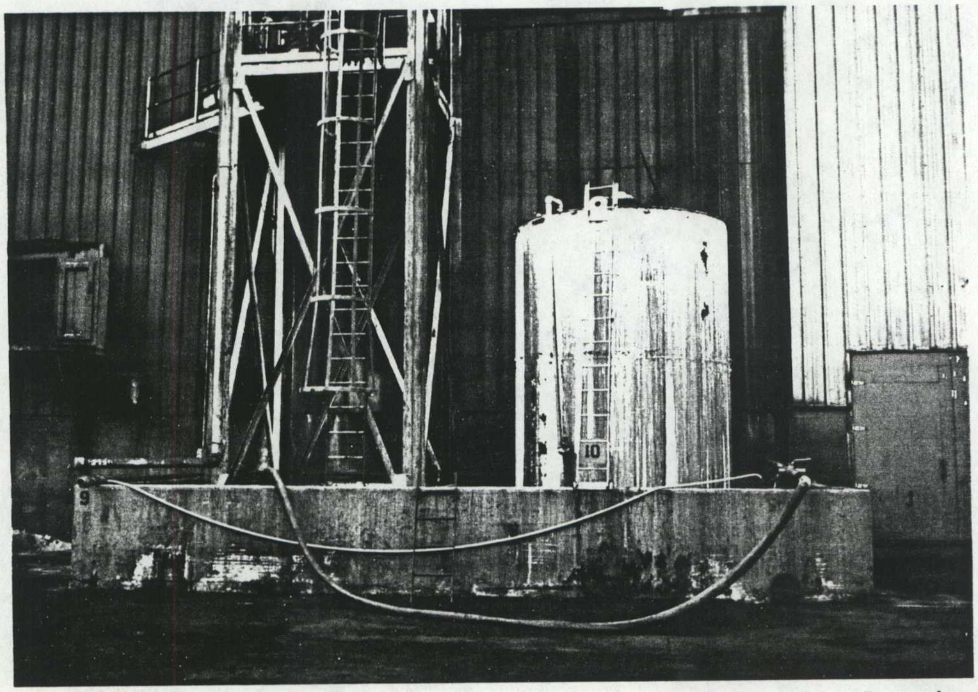
Photograph No. 6 Location: SWMU 4
Orientation: North Date: June 24, 1992
Description: The Wheelabrator Waste Sand Hopper is used for satellite accumulation of wheelabrator sand and waste shot. Dust from the dry dust collector also accumulates in this unit.



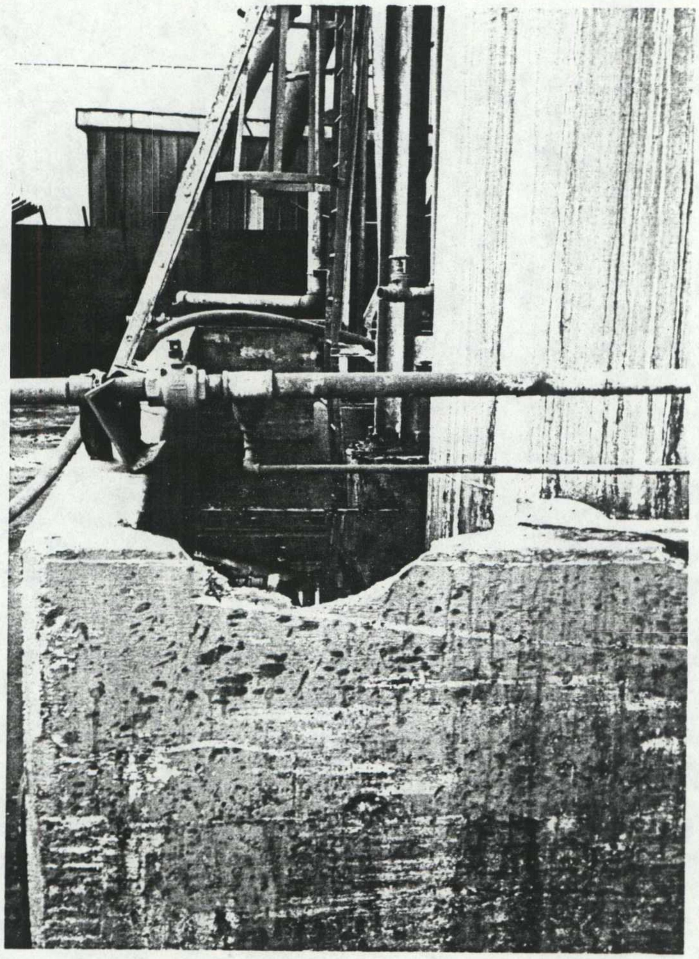
Photograph No. 7 Location: SWMU 5
Orientation: West Date: June 24, 1992
Description: The Main Plant Waste Storage Area is used to accumulate sand and core butts. This unit was emptied just prior to the photograph being taken.



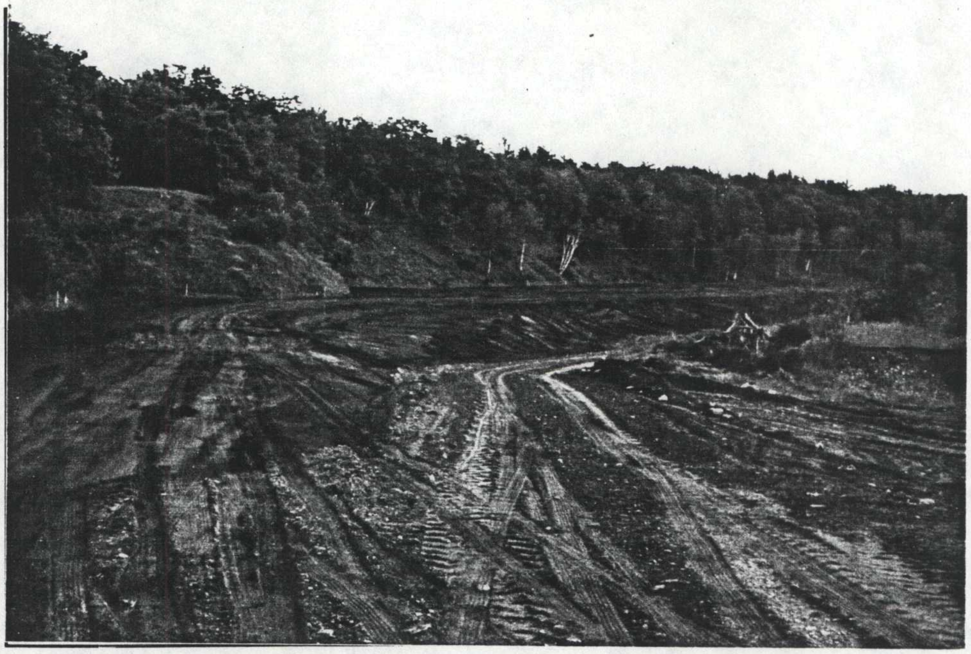
Photograph No. 8 Location: SWMU 6
Orientation: North Date: June 24, 1992
Description: The Module Molding Process Waste Hopper is used to accumulate module molding process waste sand and core butts.



Photograph No. 9 Location: SWMU 7
Orientation: North Date: June 24, 1992
Description: Core Oil Bunker stores PCB capacitors and transformers that have been removed from service; capacitors and transformers are stored in containers within the 3-foot high containment wall of the unit.



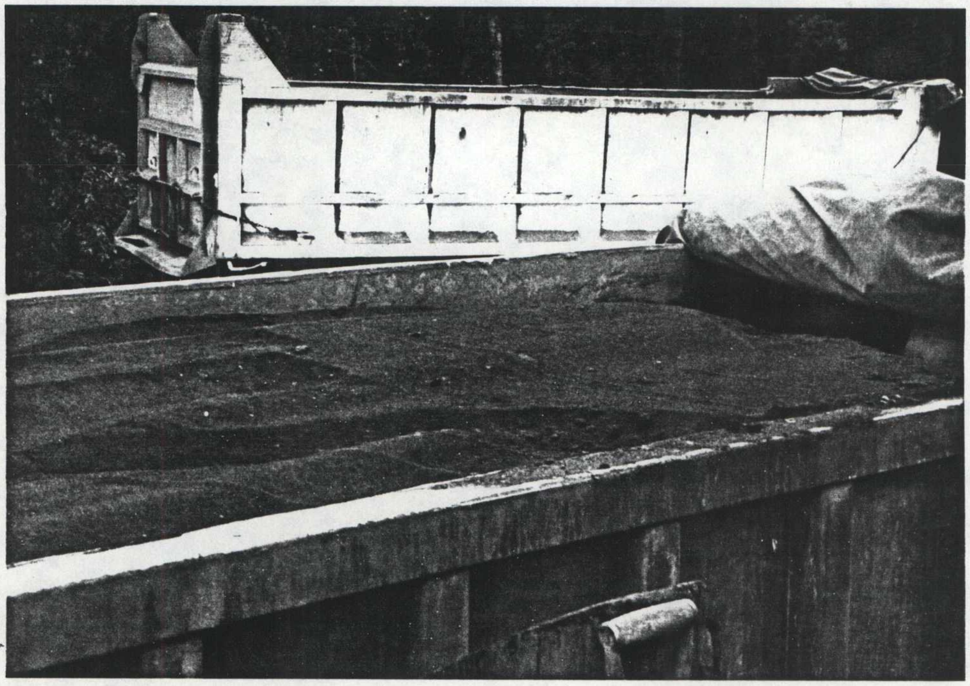
Photograph No. 10 Location: SWMU 7
Orientation: West Date: June 24, 1992
Description: The Core Oil Bunker; note that the inside of the unit contained about 6 inches of water that will be pumped out into SWMU 2.



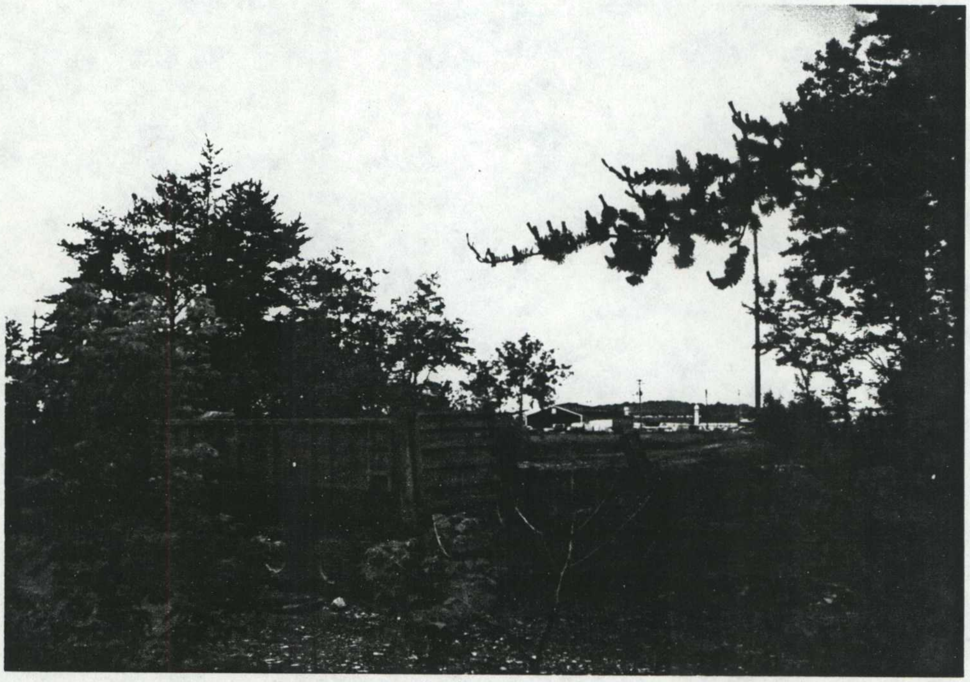
Photograph No. 11 Location: SWMU 8
Orientation: East Date: June 24, 1992
Description: The On-Site Facility Landfill; during the VSI, the facility was in the process of closing the landfill.

Photograph No. 12 Location: SWMU 9
Orientation: North Date: June 24, 1992
Description: A Semitrailer alongside the transfer area ramp is used to accumulate and transport cupola emissions dust.

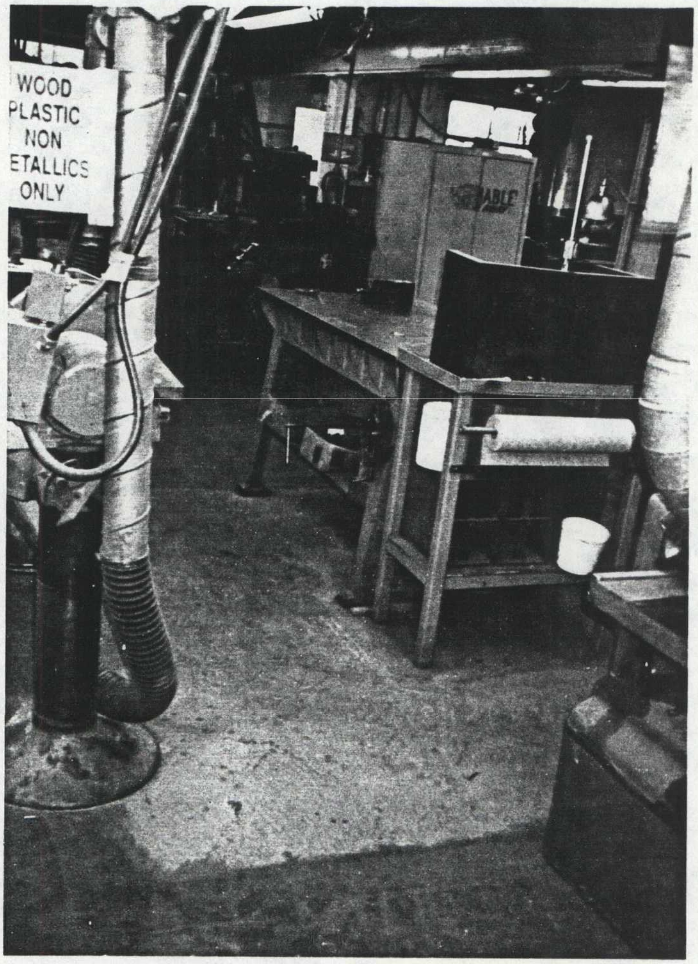
Photograph No. 13 Location: SWMU 9
Orientation: East Date: June 24, 1992
Description: Semitrailer is used to accumulate and transport cupola emissions dust.



Photograph No. 14 Location: SWMU 9
Orientation: South Date: June 24, 1992
Description: A 20-ton Semitrailer nearly full of cupola emissions dust.



Photograph No. 15 Location: AOC
Orientation: West Date: June 24, 1992
Description: The earthen transfer area ramp is used to elevate mixing trucks so that cupola emissions dust can be deposited in SWMU 9.



Photograph No. 16 Location: AOC 1
Orientation: North Date: June 24, 1992
Description: The concrete floor in the pattern shop covers the former Underground Storage Tanks (UST). Core oil and parting oil USTs remain below the pattern shop floor after in-place abandonment of the units. Note the fresh concrete slab where the units were accessed.

ATTACHMENT B

VISUAL SITE INSPECTION FIELD NOTES

30 Wed 4/29/92

Grede Foundries, Inc. / Kingsford

805 Arrive on site. Met w/ Ron Olsen, Grede.

Explain purpose of USI - Jeff Swano, Keith Foszcz - PRC

Bill Grede founded in 1920. family owned. all foundries owned and operated by Grede Inc.

Storm Sewers throughout facility and parking lots.

They make highly cored (internal passages) castings (hydraulic bells).

Discuss flow charts of plant operations.

#2

Green sand system - molding operation

KJF

Wed 4/29/92 31

3A Isocure sand - uses the most sand, DME - amine gas activates resins to bind sand, done in ambient air

3B Shell process sand
- start up/resin coated silica
- heat to bind sand - 450°F

3C Furset sand Process - not used much - warm air - 250-300F
- raw sand + resins or oils

3d Oil core sand process
- makes specialty ~~maps~~ cores KJF

4 Cleaning and grinding of castings - Wheelabrator - blasts/skel shot at castings to remove access sand, self recycle of

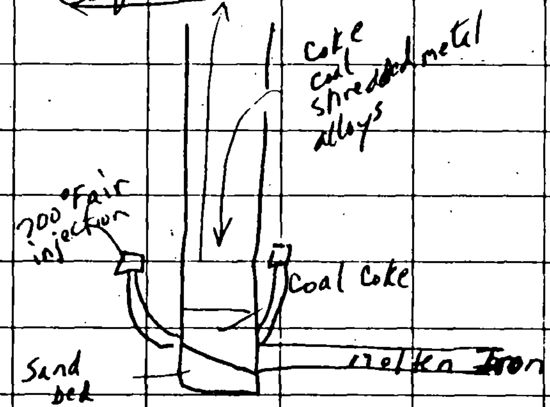
KJF

shot, shot replenished automatically as it wears out) - it gets sucked out with dust as they wear.

sand wheel grinders

Furnaces - (2) 28 ton holding
(2) 2 ton cupola furnaces.

Cupola:



In the process of disassembling one of the cupola's and will do the same with the other. But will replace with only one new furnace.

KJF

Waste transporter: Ed Gauthier & Sons Excavating in Kingsford

Type II landfill: United Waste Systems in Menominee, MI

Metallurgical testing
- spectrometer
- validator

no wastes generated except waste iron

Sand Lab
- check tensile, compression, screening, clay content, of sand cores - no wastes generated

Sanitary & Storm sewers go to I.M. in Kingsford treatment Plant.

KJF

Grede uses City water for production;
Kingsford ~~uses~~ obtains its water from
wells.

Grede landfill - same ID #
Purchased the land late 70's,
used KJF 8/86 - 7/90, 28 acres
total, 56,000 yd^3 / disposed of waste
before ~~[illegible]~~ KJF closed. All foundry
wastes went to landfill

Previous disposal was to Smeester
Property unlicensed landfill,
from late 60's to 1986 when it
was closed by the MDNR. Run
by Smeester Bros. Trucking

Sludges include - fine sand, clay,
oxides, metalic grindings

KJF

history:
original foundry was co-occupped
by Grede and Lakeshore Inc. - a
Machining & Fabrication of Mining
Equipment, Grede made the
castings for Lakeshore from 1946-65.
1965 Lakeshore moved out because both
companies were expanding.

TET - Jim Furness of California - developed TET
Process in 1983

Reason: in early 70's shredded car
bodies → metals and paint from cars → Pb & Cd

In about 1980 Grede started a so-called -
treatment of the cupola dust, addition of
bentonite - not dilution because at 661
ratio they would get 100 times reduction
in concentrations.

Started again with Jim in 1990

KJF

because of consent agreement.
Earlier this yr. approved TET
monitoring program - test monthly
and submitt to ANR yearly.
TET finally installed in Aug /91
from 83 til then was just talk.
The process adds portland cement and
soda ash to the cupola dust.
Computer controls injection of cement
and soda ash, hopper w/ load cells
and augers to injection box with
air blown ducts. (mixture is
just like flour).
Test EP tox, TCLP

Per melt ton of metal
18 to 19 lbs dust
3-4 lbs portland cement
1-2 lbs soda ash
KJJ

LUSTs
(2) 12,000 gallon railroad cars,
1/4" single walled steel, actually only
one was leaking.
- contaminated soil found below
one tank, nothing remediated
- installed ~ 1955

Grede currently mixes TET
dust with moist sand at 3 to 1
for the landfill because of dust
control (consent track)
mixed since 70's, steel mix truck
haul roads are/were gravel, potentially toxic
cuz mixer drove on it.
Baghouse installed in about 1972,
prior to that all emissions went
to the air.
KJJ

Air permits # gives in
list of roles.

Water - cooling for cupola recycle system
- " for furnaces - "
glycol cooling for compressors - closed loop
No sewer discharge permit needed
Baghouse -
7 hoppers ~ 480 bags - 1' round
20' long

PCBs ~~Rollins, WI~~ KJ

disposed in 1984, by Transecology,
Inc. in Milw. WI. ~~to~~ Rollins
Environmental Services
for incineration
8 capacitors remaining on site
No transformers that contain > 50ppm
1986, 88, 89, 90 - No PCB disposal
In June 1985, 1170 lbs picked up by

KJ7

Midwest Electrical Testing &
Maintenance Co, Inc. for incin.
at Rollins in (Deer Park) TX
1991 → Aptus in Coffeeville, KS for
incineration.

PCB equipment was placed into a
barrel along w/ rags, oil dry
whatever came into contact w/ the
and placed in a bunker outside
for storage til disposal, dispose of
ASAP

One Safety Kleen tank in the
maintenance garage.

1,1,1-trichloroethane used as a carrier
agent, no waste generated but
disposed of 1/2 a barrel of 1,1,1-TCE

KJ7

raw material, changing over
to a water based carrier agent

1045 Begin Tour

see map for location

1050 P1 South, hopper of broken cores ①
measure 30" x 44" x 22 on 4 wheels
steel hopper
5-gallon buckets used to collect
cores then dumped when full
in hopper

chain conveyor settling tasks, removing
sludge ②

Process #3 Return sand system on molding
sand operation, 2 to 3 hoppers/day.

1105 North P2, Dust's in the pattern

KJF

shop ③.

1110 P3 East ④ hopper of
laddle refractory,
very old hoppers.

1113 North P4 ⑤ wheelabrator
sand hopper, via conveyor

1117 P5 East ⑥ baghouse

1120 P6 East ⑦ North Bunker for
slag + sand + refractory
(refractory is a lining material to
protect equipment from heat).
built 1992, use a front end loader
then to semi-truck, 4" in 12' slope,
by 40' with 4' walls.

KJF

72 acres. North landfill, walk out to landfill.

487 employees - around the clock
2 production shifts
3rd shift maintenance.

4 wells around landfill - 3 1/2 acres of waste - 28 acres total

Cupola Dust &
dust room sand and
foundry sand

cement mixer to tractor trailer

Boundaries - Size
East - landfill
North - Town and Country Ford - (Cardealer)
West - church / Dairy Queen
South - Residential
KJF

Landfill boundaries
- North cemetary
- East Wooded land - Iron Mountain Property
- South - wooded land.

1135 P7 East land fill
P8 East
6' perimeter fence, used to be an old gravel pit.

1140 P9 & 10, semi-trailers used to haul waste to landfill.

1145 P11 West, transfer station w/ truck

1145 P12 South, full 20 ton truck of cupola dust and sand at transfer station
KJF

1150 P13 + 14 South, South Bunker 8
molding sand & cores & sludge
built 1990, 2' foot slope in 24' by 30 by 12'

1151 P15 North, Sand and core butts from
module molding process. 9

1153 P16 North, 10 Core oil tank area,
PCB wastes barrels were stored
here when generated. 8" reinforced
concrete, ~16 x 27'
P17 West, same, built 1983

1155 P18 West, Sand and Core butts from
main plant 11 built 1978

1156 P19 North, 12 molding system sand

1200 visit sand lab
1205 metallurgical lab
RJJ

1210 Return from tour
No complaints of odors
Exit meeting
9 gets dumped into 8

1230 Left site.

weather overcast ~ 60°F

RJJ